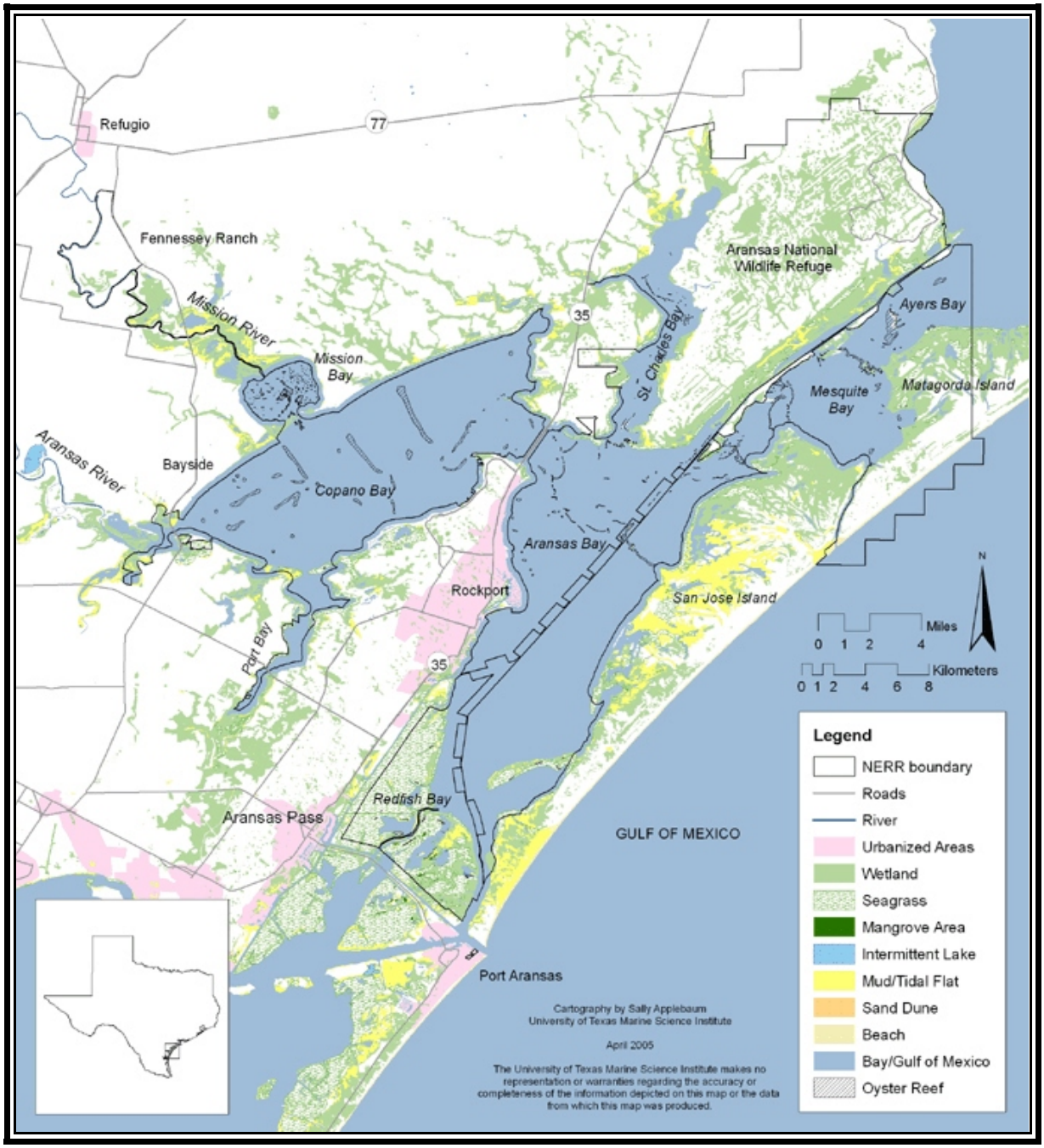
DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

FEDERAL APPROVAL OF THE
TEXAS NATIONAL ESTUARINE RESEARCH RESERVE AND MANAGEMENT PLAN:
THE MISSION-ARANSAS ESTUARY

August 2005

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT
ESTUARINE RESEARCH DIVISION

REFERENCE MAP
TEXAS NATIONAL ESTUARINE RESEARCH RESERVE



NOTE TO REVIEWERS

This is a Draft Programmatic Environmental Impact Statement (DPEIS) prepared to review the environmental consequences of a Federal action to approve a potential site nominated by the State of Texas to the National Estuarine Research Reserve System. The statement looks at the nominated site in its entirety along with a Management Plan that will serve to guide all aspects of managing the site for the conduct of research, education and outreach activities, and related management, acquisitions and community purposes. Future actions such as potential changes to boundaries, acquisition and construction related activities would receive additional reviews within the framework of this programmatic document but only with the supplemental information needed to make informed decisions of the action in question and help to avoid costly and unnecessary repetition of information.

NOAA gratefully acknowledges the very considerable contributions in providing site specific information by the University of Texas Marine Science Institute for this DPEIS.

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LIST OF ACRONYMS

ANWR	Aransas National Wildlife Refuge
BBL	Unit of measurement for oil (barrel = 42 US gallons)
CBBF	Coastal Bend Bays Foundation
CBGA	Coastal Bend Guides Association
CBLT	Coastal Bend Land Trust
CCA	Coastal Conservation Association
CCBNEP	Corpus Christi Bay National Estuary Program
CCC	Coastal Coordination Council
CELP	Coastal and Estuarine Land Conservation Program
CFR	Code of Federal Regulations
CHRIS	Chemical Hazards Response Information System
CMP	Coastal Management Plan
CNRAs	Coastal Natural Resource Areas
CZMA	Coastal Zone Management Act
ERD	Estuarine Reserves Division
EIS	Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FWCA	Fish and Wildlife Coordination Act
GCD	Groundwater Conservation Districts
GIS	Geographic Information System
GIWW	Gulf Intracoastal Waterway
GLO	Texas General Land Office
GPS	Global Positioning System
K-12	Kindergarten through twelfth grade
MOU	Memorandum of Understanding
MP	Management Plan
MRRP	Monofilament Recovery & Recycling Program
NEAC	Nueces Estuary Advisory Committee
NEPA	National Environmental Policy Act
NERR	National Estuarine Research Reserve
NERRS	National Estuarine Research Reserve System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRCS	Natural Resources Conservation Service
NWP	Nationwide Permit (U.S. Army Corps of Engineers)
NWS	National Weather Service
OCRM	Ocean and Coastal Resource Management
OMSA	Offshore Marine Supply Association
OPUS	Organization for the Protection of an Unblemished Shoreline
OSPR	Oil Spill Prevention and Response Program
OSPRA	Oil Spill Prevention and Response Act of 1991
PCCA	Port of Corpus Christi Authority

PINS	Padre Island National Seashore
PSF	Permanent School Fund
RRC	Texas Railroad Commission
RRT	Regional Response Team
SES	Site Evaluation Subcommittee
SLB	School Land Board
STAC	Scientific and Technical Advisory Committee
SPMWD	San Patricio Municipal Water District
SSC	Site Evaluation Committee
STCZAC	South Texas Coastal Zone Advisory Committee
STSSN	Sea Turtle Stranding and Salvage Network
SWCD	Soil and Water Conservation District
TABS	Texas Automated Buoy System
TAC	Texas Administrative Code
TAMU	Texas A&M University
TAMU - CC	Texas A&M University - Corpus Christi
TCOON	Texas Coastal Oceanic Observation Network
TCEQ	Texas Commission of Environmental Quality (formerly TNRCC)
TCMP	Texas Coastal Management Program
TMMSN	Texas Marine Mammal Stranding Network
TNC	The Nature Conservancy
TNRCC	Texas Natural Resource Conservation Commission
TNRIS	Texas Natural Resources Information Service
TPWD	Texas Parks and Wildlife Department
TRC	Texas Railroad Commission
TSA	Texas State Aquarium
TSFA	Texas Seafood Association
TSPA	Texas Seafood Producers Association
TSN	Turtle Stranding Network
TSSWCB	Texas State Soil and Water Conservation Board
TWDB	Texas Water Development Board
TWOA/AWO	Texas Waterway Operators Association/American Waterway Operators
TxDOT	Texas Department of Transportation
USACOE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USNPS	United States National Park Service
UTA	University of Texas at Austin
UTMSI	University of Texas Marine Science Institute
YETA	Youth and Environmental Training Area

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EXECUTIVE SUMMARY

The University of Texas Marine Science Institute (UTMSI) with an endorsement by Governor Rick Perry of Texas, have submitted a nomination to designate parts of the Mission-Aransas Estuary as a National Estuarine Research Reserve (NERR). With passage of the Coastal Zone Management Act of 1972 (CZMA), the Federal government officially recognized the national significance of coastal resources and authorized the Federal Coastal Zone Management Program (CZMP) and the National Estuarine Research Reserve System (NERRS). In response to the CZMP, the state of Texas established the Texas Coastal Management Program (CMP), which was federally approved by National Oceanic and Atmospheric Administration (NOAA) in 1997. The Texas CMP coordinates state, local, and Federal programs for the management of Texas coastal resources. Both the CZMP and NERRS are administered by NOAA. Since 1972, parts of twenty-six estuaries have been designated in the NERRS. The NERRS works with existing Federal and state authorities to establish and operate research reserves and provide for their long term stewardship.

Research and education are the main focus of the NERRS. Major goals of NERR sites include:

- address the information needs of resource managers and the public identified as significant through coordinated estuarine research within the System,
- promote Federal, state, public and private use of the proposed reserve for research (Figure 3),
- conduct and coordinate estuarine research within the System,
- gather and make available information necessary for improved understanding, use and management of estuarine areas, and
- provide suitable opportunities for public education and interpretation.

Figure 3. Teaching estuarine research methods on the UTMSI R/V Katy.

The Mission-Aransas Reserve (200,137 acres/ 312 sq. mi./ 810 sq.km.) consists of a combination of approximately 129,567 acres of state-owned coastal habitat, including estuarine intertidal marsh and shallow open-water bottoms and approximately 66,216 acres of estuarine marsh and non-tidal coastal plain habitat that is part of the Aransas National Wildlife Refuge. The site also encompasses the Buccaneer Ranch Cove Preserve (728 acres), the Fennessey Ranch (3,324 acres), and the Goose Island State Park (271 acres) (see Reference Map). The site includes a diverse suite of estuarine and non-estuarine habitats (many of high quality) that form major representative parts of a coastal watershed. The site also includes a number of archaeological sites (i.e., Indian middens) and supports significant faunal and floral components. The site is relatively rural with limited industrial and community impacts. Portions of the estuary including the rights-of-way associated with the Gulf Intracoastal Waterway and the transportation right-of-way along the Copano Bay Bridge (Highway 35) are not included in the proposed site.

The lands within the site are owned by a combination of state, Federal and private entities. The Texas General Land Office (GLO) owns the majority of submerged lands (bays and open water) within the site. The U.S. Fish and Wildlife Service (USFWS) owns the Aransas National Wildlife Refuge, which includes Matagorda Island. The Texas Parks and Wildlife Department (TPWD) owns the Goose Island State Park. Private landholders will include the Coastal Bend Land Trust, The Nature Conservancy, and the Fennessey Ranch. Designation of the Texas NERR will not introduce new state or Federal regulations, nor will it prohibit traditional uses of the area. Current uses include boating, fishing, hunting, mining (gas and oil), shellfish harvesting, camping and other recreational activities. Measures will be taken to ensure the integrity of selected core research sites for the conduct of long term research needs.

The Mission-Aransas NERR will be administered by the UTMSI, the lead agency for the proposed reserve. Other key state, Federal and private partners in the Texas NERR include the USFWS, GLO, TPWD, Coastal Bend Land Trust, The Nature Conservancy, and the Fennessey Ranch. Further information on the administration and management of the Texas

NERR can be found in the Mission-Aransas NERR Management Plan (Attachment A). The management plan describes the administration, existing resource protection, boundaries/acquisition plan, stewardship plan, public access plan, facilities/construction plan, research and monitoring plan, education/interpretation/outreach plan, and the volunteer plan.

In addition to the preferred alternative, other alternatives relative to the establishment of a NERR site in Texas are considered, including the "no action" option of not designating a site, and alternative boundaries and/or alternative management options for the NERR. Under the no action option, the lands within the NERR boundary would continue to be managed under separate programs administered by the responsible state, Federal or private landholding agency. Additional Federal grant awards to manage the site, provide extra funds for carrying out research and educational efforts would not be awarded. Although these lands would continue to be protected, they would be managed differently, dictated by varying available resources and priorities of the respective agencies involved. The potential for sale and development of the Fennessey Ranch without a conservation easement would be a possibility. Reserve designation would provide a clear alternative to current management of these lands by combining and magnifying the resources of each landholding agency or partner. Alternative boundaries for the site are considered and largely involve limited modifications to core and buffer area designations. Alternative management options include modifications to the roles and responsibilities of management partners.

The consequences of NERR designation and management plan implementation will be environmentally, socially, and economically positive as the number of disparate sites within the estuary are tied together through linkages and ecosystem understanding. Minor physical alterations and impacts will be restricted to limited areas associated with construction of new facilities and access sites associated with future growth and potential acquisition. Overall, the natural resources of the area will benefit from greater protection and management and the site will serve to foster better understanding of the importance of these resources.

1.0 INTRODUCTION

1.1 The National Estuarine Research Reserve System

The National Coastal Zone Management Act of 1972 (Act, P.L. 92-583, as amended, hereinafter the Act) was designed to assist coastal States, territories and local governments in developing tools and programs to improve their management capabilities of the rapidly developing coastal zone to help protect, preserve, develop and restore the fragile natural resources such as the bays and estuaries, the beaches, dunes and wetlands, and the flora and fauna that are dependent on those habitats. Because scientific knowledge was often lacking to assist decision makers, developers and the public in understanding how the coastal ecosystems worked and the consequences associated with development activities so essential for growth and well-being, Congress provided an additional incentive in the Act to assist coastal management regimes provide answers to unknown questions regarding the importance and sensitivities of estuaries and their watersheds. Section 315 of the Act set in motion the opportunity to provide laboratories and educational facilities in representative estuaries around the Nation.

After 30 years of implementing Section 315, the United States and its Trust Territories now enjoy the benefits of what is known as the National Estuarine Research Reserve System (NERRS) as a network of protected places that serve as reference sites for research, education and stewardship. Reserves represent different biogeographic regions of the United States.

A biogeographic region is a geographic area with similar dominant plants, animals and prevailing climate. There are 11 major biogeographic regions around the coast, with 29 sub regions. The reserve system currently represents 18 of those sub regions and is designed to include sites representing all 29 biogeographic subregions (Figure 4). In the near term, priority for Federal designation of new NERR sites is given to coastal states that are in unrepresented biogeographic regions. *The Texas proposal is the latest site to be nominated for approval and is the subject of this environmental impact review.*

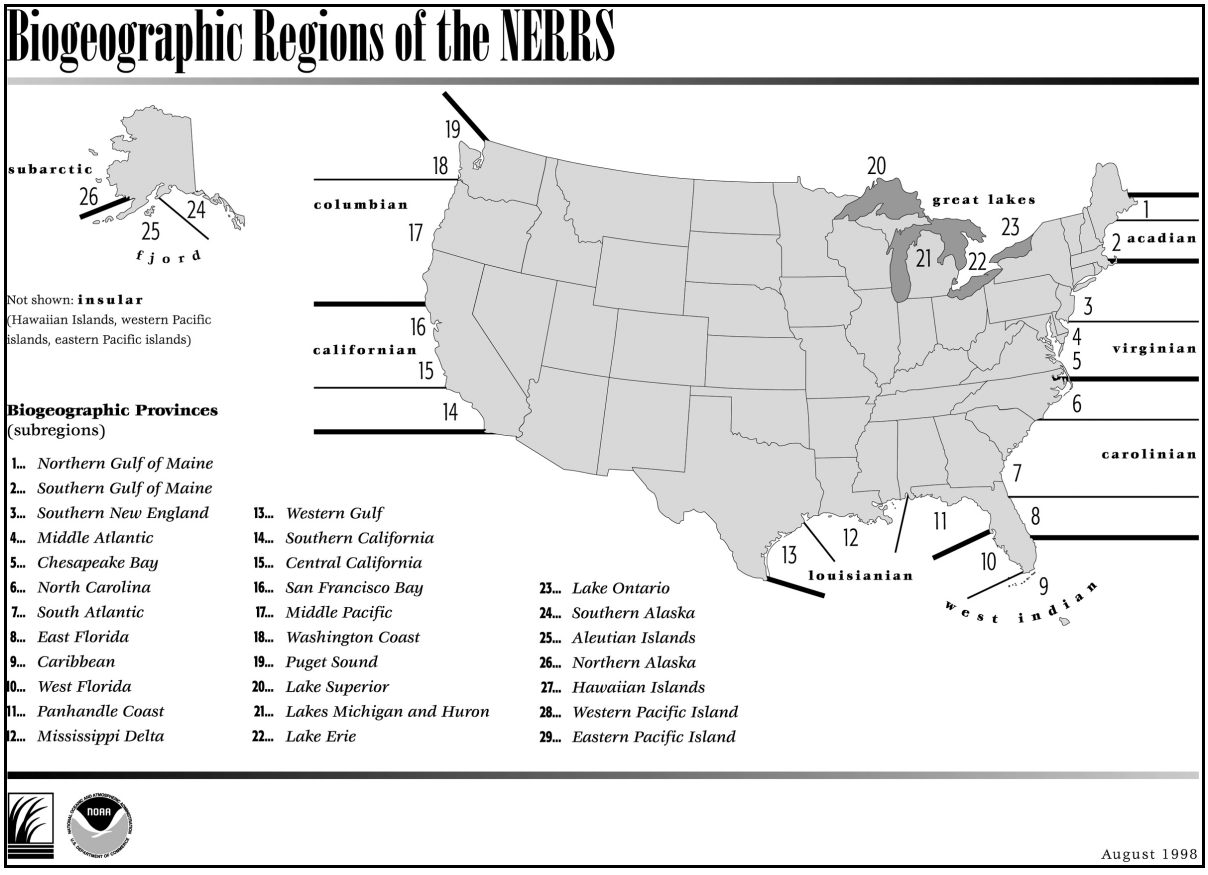

Figure 4. Biogeographic regions representing diverse estuarine environments.

NERRS is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. NOAA provides funding, national guidance and technical assistance. Each reserve is managed on daily basis by a lead state agency or university, with input from local partners.

Reserve staff work with local communities and regional groups to address natural resource management issues, such as non-point source pollution, habitat restoration and invasive species. Through integrated research and education, the reserves help communities develop strategies to deal successfully with these coastal resource issues. Reserves provide adult audiences with training on estuarine issues of concern in their local communities. They offer field classes for K-12 students and support teachers through professional development programs in marine education. Reserves also provide long-term water quality monitoring as well as opportunities for both scientists and graduate students to conduct research in a "living laboratory."

1.2 The Texas NERR in relation to the other NERR sites

The proposed Texas NERR would designate over 200,000 acres of the Mission-Aransas Estuary making it the third largest NERR in the Nation. Table 1 below shows the other NERR sites along with their year of designation and size. There is a great deal of diversity to be found in these sites and the Texas site would provide a significant addition to the resources and capabilities of the total NERRS (Figure 5). The rich diversity of habitat types that are found in the Mission-Aransas Estuary will continue a tradition of excellent choices made by the coastal states and territories in the site selection process (Figure 6).

Table 1. Reserve Designation Dates, Acreage and Biogeographic Regions.

Reserve	Year	Acres†	Sq. Mi	Sq. Km	Region
South Slough, OR	1974	4,779	7.0	18.2	Carolinian (7)
Sapelo Island, GA	1976	6,110	9.5	24.7	Carolinian (7)
Rookery Bay, FL	1978	110,000	171.9	445.2	West Indian (10)
Apalachicola Bay, FL	1979	246,000	385.6	998.6	Louisianian (11)
Elkhorn Slough, CA	1979	1,400	2.2	5.6	Californian (15)
Padilla Bay, WA	1980	11,000	16.7	43.3	Columbian (19)
Naragansett Bay, RI	1980	4,259	6.7	17.2	Virginian (3)
Old Woman Creek, OH	1980	571	0.9	2.3	Great Lakes (21)
Jobos Bay, PR	1981	2,883	4.4	11.3	West Indian (9)
Tijuana River, CA	1982	2,513	3.9	10.2	Californian (14)
Hudson River, NY (4 components)	1982	4,838	7.6	19.6	Virginian (3)
North Carolina (4 components)	1985, 1991	10,000	15.6	40.5	Carolinian (6)
Wells, ME	1986	1,600	2.5	6.5	Acadian (2)
Chesapeake Bay, MD (3 components)	1985, 1990	4,820	7.5	19.5	Virginian (5)
Weeks Bay, AL	1986	6,016	13.3	34.6	Louisianian (11)
Waquoit Bay, MA	1988	2,600	3.5	9.1	Virginian (3)
Great Bay, NH	1989	5,280	8.3	21.4	Acadian (2)
Chesapeake Bay, VA (4 components)	1991	4,435	6.9	17.9	Virginian (5)
Ace Basin, SC	1992	134,710	213.4	552.8	Carolinian (7)
N. Inlet Winyah Bay, SC	1992	12,327	19.3	49.9	Carolinian (7)
Delaware	1993	4,930	7.7	20.0	Virginian (4)
Jacques Cousteau, NJ	1998	114,665	178.1	461.3	Virginian (4)
Kachemak Bay, AK	1999	365,000	570.3	1477.1	Fjord (25)
Grand Bay, MS	1999	18,400	28.1	72.8	Louisianian (12)
GTM, FL	1999	55,000	85.9	222.6	Carolinian (8)
San Francisco Bay, CA	2003	3,710	5.8	15.0	Californian (16)
*Mission-Aransas Estuary, TX	(2005)	200,137	312.7	809.9	Louisianian (13)

† Acreage based on current, federally approved management plans.
* Proposed NERR site

ACE Basin, S.C.

Elkhorn Slough, CA

Jacques Cousteau, NJ

North Carolina, NC

South Slough, OR

Apalachicola, FL

Great Bay, NH

Jobos Bay, PR

Old Woman Creek, OH

San Francisco Bay, CA

Rookery Bay, FL

Delaware, DE

Hudson River, NY

Katchemak Bay, AK

Padilla Bay, WA

Sapelo Island, GA

Wells, ME

Figure 5. Diversity of environments embodied in the NERRS.

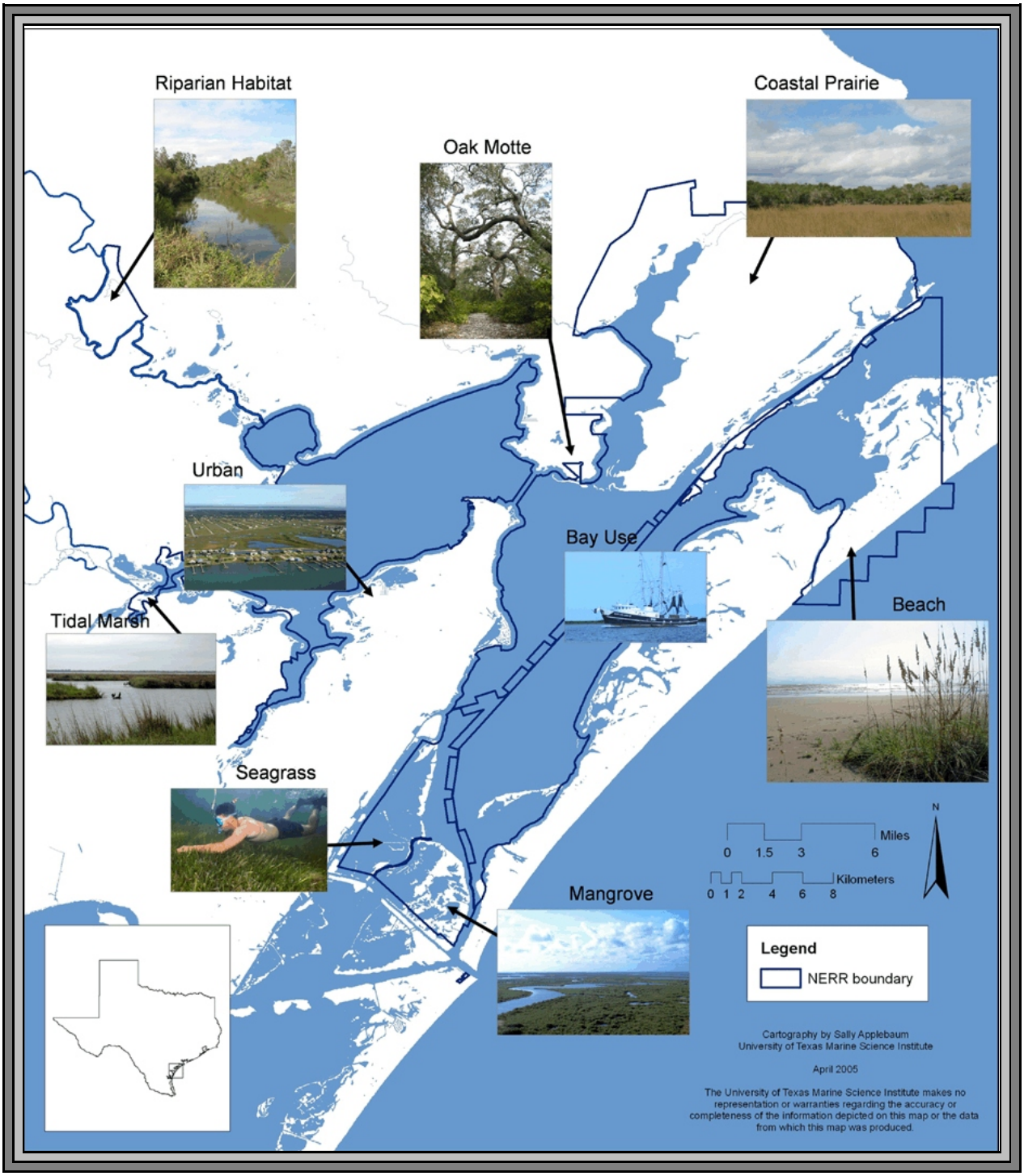

Figure 6. Habitats and uses within the Mission-Aransas Estuary.

1.3 Proposed Mission and Goals of the Reserve

The mission of the proposed Reserve is to provide opportunities for long-term research, education, and interpretation. To meet this end, the following goals that are similar to other NERR designated sites and support the goals of the NERRS are identified:

- Ensure a stable environment for research through long-term protection of important estuarine habitat;

  NERR sites serve as living laboratories for on-site staff, visiting scientists and graduate students. Since its inception, a main goal of the program has been to ensure a stable environment for research through long-term protection of reserve system resources. The reserves serve as platforms for long-term research and monitoring, as well as reference sites for comparative studies.

Figure 7. Students learning estuary science.

- Address coastal management issues identified as significant through coordinated estuarine research within the System;

  The National Estuarine Research Reserve System-wide Monitoring Program tracks short-term variability and long-term changes in estuarine waters to understand how human activities and natural events can change ecosystems. It provides valuable long-term data on water quality and weather at frequent time intervals on a continuous basis.

  The Coastal Training Program provides up-to-date scientific information and skill-building opportunities to individuals who are responsible for making decisions that affect coastal resources. Through this program, National Estuarine Research Reserves can ensure that coastal decision-makers have the knowledge and tools they need to address critical resource management issues of concern to local communities.

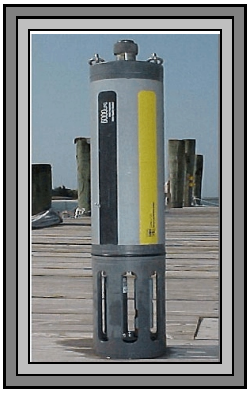

Figure 8. Monitoring buoys used in NERRs.

- Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;

  National Estuarine Research Reserves are federally designated "to serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation." The reserve system is one of only three programs within NOAA in which education is federally mandated, and the reserve system provides a range of educational programming to key audiences in reserve watersheds.

Figure 9. Elderhostel activity studying natural resources.

- Promote Federal state, public and private use of the proposed reserve when conducting estuarine research;

  Stewardship is a functional role at each reserve, involving aspects of research, monitoring, education, policy and implementation of resource management actions. Many reserves have stewardship coordinators that work as an integrated team with other staff. Since reserve resources are often affected by activities on adjacent waters and watershed lands, stewardship involves close cooperation with stakeholders outside the reserve.

Figure 10. Bay wetlands.

- Conduct and coordinate estuarine research within the national system and provide information necessary for improved understanding and management of estuarine areas.

Figure 11. Man made island in Aransas Bay.

As living laboratories, National Estuarine Research Reserves are ideal settings to investigate the restoration and protection of estuarine and coastal habitats. The reserve system offers habitat diversity, scientific expertise, monitoring programs and education. Many reserves are engaged in restoration science and have experience in planning and conducting small to medium-scale restoration projects (0.5 to 250 acres). They have explored both engineering and natural approaches to return areas to approximate natural conditions.

Coastal Training Programs offered by reserves focus on issues such as coastal habitat conservation and restoration, biodiversity, water quality and sustainable resource management. Programs target a range of audiences, including land-use planners, elected officials, regulators, land developers, community groups, environmental non-profits and coastal businesses. These training programs provide a range of opportunities for professionals to network across disciplines, and develop new collaborative relationships to solve complex environmental problems.

2.0 PURPOSE OF AND NEED FOR ACTION

2.1 Purpose of NERR Designation

The purpose of this action is to designate the Mission-Aransas Estuary in Texas as a site in the NERRS. The proposed site will involve the cooperation and interaction of a unique combination of Federal, state, local and private partners. The proposed Texas site will protect representative natural habitats through joint Federal-state partnerships and utilize operation and management plans developed to increase awareness and stewardship of the resources assures benefits that can be enjoyed by the people of Texas and visitors to the area. The designation of the Mission-Aransas NERR would also represent a significant addition to the national network of NERR sites because of unique estuarine types not currently represented in the NERR system. The Mission-Aransas NERR will use existing authorities to ensure a stable environment for long-term research and provide a coordination oversight mechanism to achieve this goal.

A NERR site will represent an area where long-term and short-term research projects and programs can be initiated, thereby contributing to a better understanding of the biotic and physical nature of these habitats. The existence and proposed use of a NERR site (including the use of available facilities) will be an attractive aspect of research proposals submitted for funding by potential researchers. As part of the national NERR network of sites, the Mission-Aransas NERR will also be part of long-term water quality and biotic monitoring programs that represent an unprecedented effort to compare similar aspects of multiple sites. An additional benefit is that the Mission-Aransas NERR will provide opportunities to study the interactions between human activities and natural estuarine processes to develop better methods to further minimize future impacts.

An established reserve will also allow for the development of interpretive and educational programs that will be attractive to both local and regional school systems. Schools of all levels can be encouraged to use the site's physical facilities and associated interpretive areas for single or multiple field trips. Tours of more remote portions of the proposed reserve can be developed and offered. Local schools may be encouraged to use the site's facilities and habitats as sites for long-term monitoring and assessment programs that can be coordinated with the site's educational programs. As for any use of the site for research, the value of the establishment of a NERR site lies in the long-term presence of the site and the availability of facilities.

The proposed Mission-Aransas NERR is composed of a combination of state, Federal, and privately owned properties that will allow for shared resources (e.g., personnel, technical assistance) among respective agencies. Additional resources (e.g., personnel, funds) will undoubtedly be contributed by many other governmental agencies, non-governmental organizations, industries, and citizens groups that have supported the Mission-Aransas NERR initiative. These groups have been highly supportive of the NERR process through their participation in the site selection process, and will continue to contribute to the remaining tasks required to designate and operate a Mission-Aransas NERR.

2.2 The Proposed Action and Decision to be Made

Based on a recommendation from UTMSI acting on behalf of the State of Texas, NOAA proposes that a NERR be established for the Mission-Aransas Estuary. A site nomination proposal for the establishment of this research reserve was approved by the State of Texas and by NOAA in 2004. NOAA is following the procedures for nominating a NERR site in accordance with the established regulations that are found in Attachment A, Appendix 1: 15 CFR - NERRS Regulations. From the onset, considerable effort was made to include broad and diverse public and private participation in the site selection process. This approach reflected the view that any future Mission-Aransas NERR would benefit from the creation of a broad base of support from the beginning. Participatory groups and individuals would have had the opportunity to provide input and support in the process from the beginning and would, therefore, develop a sense of "ownership" in the process and the future of the NERR project. The composition of both the Site Selection Committee (SSC) and Site Evaluation Subcommittee (SES) reflected this effort to include a diverse range of participants. Invitations to participate in the process through membership in the SSC were sent to 374 people, representing a wide range of public and private groups and individuals that were believed to have interests in this effort. The resulting SSC included representatives from local, state and Federal agencies, private sector business (industrial and agricultural), environmental groups, and local, state and Federal level elected officials. The SES is a smaller, technical working group. Included in this committee are representatives of regulatory agencies (State and Federal), local governments, environmental interests, and private industry. The SES has been extremely valuable to the process through their active participation in subcommittee meetings and verbal and written support of the project.

The Mission-Aransas NERR as defined in this document, includes the submerged bays and estuaries (below mean high tide) including Redfish, Aransas, Copano, Port, Mission, St. Charles, Mesquite, and Ayers Bay. The Mission-Aransas NERR also includes uplands in the Aransas National Wildlife Refuge, Goose Island State Park, Fennessey Ranch, and Buccaneer Cove Preserve. (See Reference Map, inside Front Cover and Table 2, Inventory of Habitat Areas).

Table 2. Inventory of habitat areas (in acres) for each Reserve partner's lands. Abbreviations: General Land Office (GLO), Aransas National Wildlife Refuge (ANWR), Coastal Bend Land Trust (CBLT), Goose Island State Park (GISP), and University of Texas at Austin, and Marine Science Institute (UTMSI).

Habitat	Total Boundary	GLO	ANWR	Fennessey Ranch	CBLT	GISP	UTMSI
Bay/Gulf of Mexico	118,786	117,041	1,625	0	108	12	0
Beach	332	90	242	0	0	0	0
Impounded Area	126	0	126	0	0	0	0
Intermittent Lake	16	16	0	0	0	0	0
Lake	540	124	135	281	0	0	0
Mangrove Area	65	65	0	0	0	0	0
Mud/Tidal Flat	1,961	600	1,320	0	41	0	0
Oyster Reef	96	96	0	0	0	0	0
River or Stream	62	0	62	0	0	0	0
Seagrass	9,727	8,091	1,435	0	141	60	0
Wetland	28,316	3,208	24,456	266	343	40	3
Terrestrial	40,110	236	36,815	2,777	95	159	28
Total Area	**200,137**	129,567	66,216	3,324	728	271	31
%of Area	100%	64.74%	33.09%	1.66%	0.36%	0.14%	0.02%

The purpose of this draft programmatic environmental impact statement (DPEIS) and draft management plan (MP) is to provide information for decision makers and the interested public on the potential impacts associated with designation as a NERR under Federal authorities and providing Federal funding to support the implementation of the MP. The MP describes an organizational framework for the Mission-Aransas National Estuarine Research Reserve (NERR) and articulates proposed policies that will protect the ecological integrity of proposed sites while improving their value for research, monitoring, education, and stewardship purposes. The plan will provide guidance to the development of the Mission-Aransas NERR over the next five years, or until the plan is revised and updated.

2.3 The Scoping Process

In an effort to better understand what the concerns of interested parties might be with respect to the designation of the Mission-Aransas NERR, considerable effort was made to include broad and diverse public and private participation through the NEPA scoping process. This approach reflected the view that any future Mission-Aransas NERR would benefit from the creation of a broad base of support from the beginning. Participatory groups and individuals would have had the opportunity to provide input and support in the process from the beginning and would, therefore, develop a sense of "ownership" in the process and the future of the NERR project.

Although Federal regulations require one public scoping meeting, three were held because of the large geographical distance encompassing the proposed Mission-Aransas NERR. One scoping meeting was held in Austin, Texas on November 16, 2004 at 10 a.m. at the Texas State Capitol Extension. One was held in Port Aransas, Texas on November 17, 2004 at 9 a.m. at UTMSI and the final meeting was held on November 17, 2004 at 4 p.m. at the Saltwater Pavilion in Rockport, Texas. The public was notified of the meetings through posting in the Federal Register and advertisement in local newspapers. The Federal Register notice was posted 16 days in advance, on November 1, 2004. The first newspaper advertisement was posted 14 days in advance and a total of 17 different runs were made in ten different papers serving local towns and cities. In addition, approximately 470 letters were sent to affected landowners and user groups.

The first scoping meeting held in Austin was primarily attended by representatives of state, Federal, legislative, and non-governmental organizations. The second meeting in Port Aransas was primarily attended by local state and non-governmental organizations. The third meeting in Rockport was primarily attended by non-governmental organizations and local government officials and citizens. The scoping meetings were well attended with a total turnout of 143 individuals.

Comments were largely supportive of the proposed nomination. Several significant issues were raised at the scoping meetings some of which are addressed in the DPEIS and some are addressed in the draft MP. The US Army Corps of Engineers and the Gulf Intracoastal Canal Association both stated that they supported the Mission-Aransas NERR initiative, but requested that the Gulf Intracoastal Waterway (GIWW) be removed from the proposed boundary because of the long-standing established use and operation and maintenance requirements associated with this transportation corridor. After careful consideration, the GIWW has been removed from the boundary. Several questions involving the technical aspects of management were brought up, such as future and current boundary modifications, perpetual designation, university partnerships, and restrictions. Legalities behind future boundary modifications were addressed. There was also a large amount of concern in opposition of the 1000' boundary setback. This issue has been addressed by the Texas General Land Office. More information can be found in the MP, section 4.2 (Attachment A). There were also other concerns about the effects on oil and gas within the Mission-Aransas NERR boundary. This issue is discussed in great detail in the draft MP (Attachment A, Appendix 2). During the public scoping meeting, a question about water flow manipulation on Fennessey Ranch was raised. This question is discussed in Section 5.2.1. A summary of the issues raised and where the concerns are addressed in listed in Table 3.

Table 3. Issues raised during scoping process.

Issue	Where Discussed in MP, unless otherwise noted
Freshwater inflow	2.0 Resource Description 8.2 Research Program Goals and Objectives Objective 1-7 Appendix 2
University partnerships	Mission statement 3.2 Administrative Program Goals and Objectives Objective 1-1, 2-1, 3-1, Action 6
Influence of oil and gas activities	8.2 Research Program Goals and Objectives Objective 1-8, Action 1 Appendix 2
Sensitivity of historical and archeological resources	2.0 Resource Description
Ecotourism	5.2 Stewardship Program Goals and Objectives Objective 2-3
Education outreach for communities in watershed (Refugio and San Patricio Counties)	9.2 Education Program Goals and Objectives Objective 2-12
Restoration and clean-up	5.2 Stewardship Program Goals and Objective Objective 3-7
Continued use of dredging and spoil islands	4.1 Boundary Description and Rationale
Include transportation opportunities for education programs	9.2 Education Program Goals and Objectives Objective 2-13
Exclusion of GIWW from boundary	4.1 Boundary Description and Rationale
Inclusion of TxDOT and USACOE on Reserve Advisory Board	3.2 Administrative Program Goals and Objectives
GIWW effects on currents and passes	8.2 Research Program Goals and Objectives Objective 1-8
Erosion	8.2 Research Program Goals and Objectives Objective 1-8
Coliform bacteria levels in Copano Bay (water quality)	8.2 Research Program Goals and Objectives Objective 1-7
Seagrass health	8.2 Research Program Goals and Objectives Objective 1-7
Fish and oyster populations	8.2 Research Program Goals and Objectives Objective 1-7
Emergency response mechanisms for GIWW barges	Appendix 2
Water quality	8.2 Research Program Goals and Objectives Objective 1-7

Issue	Where Discussed in MP, unless otherwise noted
Educational Center located in Rockport	8.2 Facility Program Goals and Objectives Objective 3-11
Acquisition Plan	4.0 Boundaries/Acquisition Plan
Legal defense of potential conservation easements in stewardship plan	4.0 Boundaries/Acquisition Plan
Emphasize the diversity of the system	2.0 Resource Description
Map with land ownership	Inside cover
Socioeconomic research on marine transportation	5.2 Stewardship Program Goals and Objective Objective 2-2, Action 1
Impacts of recreational and commercial fishing activities (trawling)	8.2 Research Program Goals and Objectives Objective 1-8
Climate change effects	8.2 Research Program Goals and Objectives Objective 1-8
NERRS effect on oil and gas development	EIS
Core and buffer management	4.2 Boundaries/Acquisition Goals and Objectives Objective 1-2
Management activities in UTMSI property and other areas	5.2 Stewardship Program Goals and Objective Objective 3-5
Impact of NERR on ship channel commerce	EIS

After the public comment period for the draft PEIS/MP, there will be a final PEIS/MP made available for further public comment with a 30 day waiting period prior to taking Federal action.

2.4 Federal Permits, Licenses, and Entitlements Necessary to Implement the Action

A coastal lease for scientific purposes, authorized under the Texas Natural Resource Code (Ch 33.105(4)), between UTMSI and GLO for the all state submerged lands (open bays and estuaries) within the proposed NERR boundary is necessary to implement the proposed Mission-Aransas NERR (Attachment A, Appendix 5). The coastal lease has a 5-yr term that is renewable in perpetuity. This lease will be approved and renewed by the Public School Land Board at the end of each 5-year term on the same timeline used to review and revise the Mission-Aransas NERR MP. Every five years the revised MP will be submitted to the Public School Land Board along with a request to renew the lease.

Memorandums of understanding that describe the role and responsibilities between UTMSI and landholders are held by UTMSI, GLO, USFWS, CBLT, Fennessey Ranch, TNC, TPWD, and a local governmental representative mutually agreed upon by Aransas County and the city of Rockport (Attachment A, Appendix 4).

3.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 Summary of Alternatives

The Federal action proposed by NOAA is the recommendation from the State of Texas to establish a NERR in the Mission-Aransas Estuary. That action includes formal approval and joint designation by the NOAA Administrator and the Governor of Texas and will result in the awarding of annual grants for up to 70 percent for operation and maintenance costs, and additional funding for acquisition and construction of facilities in the years to come. The alternatives described include the preferred alternative (i.e., to designate the proposed site and fund MP implementation), a review of possible alternative sites or boundary configurations (i.e., other estuaries, larger or smaller boundaries than currently proposed), and the no action alternative (i.e., take no action to designate the proposed NERR).

3.2 Preferred Alternative

Generally speaking, the preferred alternative is to approve a site nominated by an applicant like the UTMSI. NOAA requires applicants to go through a rigorous site selection screening process prior to coming up with what they consider to be the best site to meet the requirements of the CZMA and implementing regulations (Attachment A, Appendix 1). The site selection process the UTMSI undertook can be found in their Site Nomination document at http://www.utmsi.utexas.edu/nerr/. The proposed site and implementation program are described at length in Attachment A and are summarized below.

Figure 12. Vessel traffic on the Gulf Intracoastal Waterway.

3.2.1 Boundary

1) Water: State submerged lands of the Mission-Aransas Estuary (including Copano, Mission, Port, St. Charles, Aransas, and northern Redfish Bays and the mouth of the Aransas River and tidal segments of the Mission River). To the south, the boundary would start north of the Aransas Pass shrimp channel. Part of Lydia Ann Channel would be included. All navigation channels, legally designated maintenance dredge disposal sites along the Intracoastal Waterway are excluded from the boundary and traditional and existing uses are expected to continue in the future (Figure 12). This means that stations for long-term research/monitoring projects will not be set up in channels where maintenance dredging or disposal related impacts are expected to occur in the future. This, however, does not imply that the impacts of disposal on the estuary will not be a subject of research interest.

2) Land: The Aransas National Wildlife Refuge (ANWR), Goose Island State Park, Fennessey Ranch (adjacent to the Mission River), and parcels owned by The Coastal Bend Land Trust (near the mouth of Aransas River), and The Nature Conservancy (tract adjacent the ANWR) include excellent upland sites allowing land/water interface studies. NOAA rules state that federally protected lands can make up to 50% of total area of a NERR site. The federally protected ANWR make up 33% of the total area. Mesquite Bay is included so that Cedar Bayou, which connects to the Gulf of Mexico, can provide access to research offshore.

The proposed boundary includes at this point nearly 200,137 acres of uplands, lakes, and freshwater wetlands; riparian and riverine habitat; tidal marshes and bays; mangrove forest, seagrass and oyster beds, and productive mud/tidal flats. The area is highly contiguous and can be subject to expansion through future donations or acquisitions by willing sellers. The boundary reflects a willingness of multiple partners to join into the program to form a NERR site. The proposed site is shown in the Reference Map inside the front cover. In places the boundary includes inland areas and in other places there is a 1,000 ft. setback from the waters edge providing the capability to conduct research, monitoring, and education activities in a variety of settings representative of a complete estuarine system.

3.2.2 Management

The UTMSI will serve as lead management agency and have a NERR Manager with staff to assist in running the day-to-day activities of the Reserve. Staff would include an education, research, and stewardship coordinator who in turn receive advice from various Advisory Committees. Reserve partners including the land owners and managers within the Reserve will serve on the Reserve Advisory Board and provide guidance and direction for key activities identified in the MP (Attachment A). The management system is tied together through various memoranda of understanding, state leases,

conservation easements. The MP contains sub-plans for important components of management including: administration, boundaries/acquisition, stewardship, public access, facilities/construction, research and monitoring, education/interpretation and outreach, and volunteer work. The MP will be a living document and subject to review and updating every 5-years. For the most part, a variety of alternatives are not available for evaluation although changes are possible for any component.

3.2.3 Goals and Objectives

The Reserve will strive to achieve a number of goals and objectives in the years ahead supported by a number of actions to help achieve the objectives. This sets the tone for the types of activities that are likely to take place in the future and important for understanding the types of impacts that will be associated with program implementation. The three chosen goals include: improving the knowledge of Texas coastal zone ecosystem structure and functions that addresses research and monitoring needs; to promote understanding of coastal ecosystems by diverse audiences that gets to the needs for conducting education of diverse audiences; and to promote public appreciation and support for stewardship of coastal resources that focuses on good management and outreach activities. A more thorough description of these goals and objectives and proposed activities can be found in the draft MP (Attachment A, Table 1). Dedicated personnel with an annual budget will help achieve these goals that are environmentally friendly and will result in positive benefits to the communities in which the reserve sites are found.

3.3 Other Alternatives Considered

As part of the NERR site selection process for Texas, several alternative sites were discussed including a proposal for a multi-site NERR. For the purposes of this environmental impact statement and reserve MP, these alternatives are briefly described along with a no action option of not siting a NERR in Texas, and alternative site and boundaries for the NERR site.

3.3.1 Alternative Sites and Boundaries

There are usually a number of ways to delineate a reserve site and management options. The NOAA required preliminary site selection process (Attachment A, Appendix 1, Section 921.11, p. 97) helps to filter out many sites through a rigorous review that includes discussions with potential property owners, include public participation, etc. in order to meet the requirements of the Federal program. The UTMSI has undergone this process and the documentation describing the estuaries reviewed, why sites were not preferred can be found as background information and is incorporated by reference in this document at: http://www.utmsi.utexas.edu/nerr/.

To summarize, two committees were formed to assist UTMSI with the numerous tasks associated with identifying, evaluating, and selecting a candidate site or sites, as well as identifying and developing appropriate local, state, Federal, and private partnerships that will ultimately define the Mission-Aransas NERR. The Site Selection Committee (SSC) was formed to provide overall guidance to the process and the Site Evaluation Subcommittee (SES) was formed to provide technical guidance to site selection process. The overall approach taken toward the formation of these committees was to identify and invite participation from as many agencies, organizations, groups, and individuals as possible, such that the broadest possible base of expertise and input could be drawn upon during this and future steps in the NERR process.

Because the Western Gulf Biogeographic Subregion is large, the preliminary site screening process began by looking at 65 sites within the major estuarine ecosystems at Matagorda Bay, San Antonio Bay, Corpus Christi Bay, Upper and Lower Laguna Madre, and the Aransas Bay. Thus, it was appropriate to use a simplified procedure to screen proposed sites to eliminate those areas that are clearly not suitable candidates prior to the application of the full suite of site selection criteria. A preliminary screening was desirable to reduce the sites considered to three to five sites, thus reducing the amount of time and effort required to apply the full suite of criteria to all sites. A candidate site which did not appear to meet each of the site selection criteria was eliminated from the site selection process. These sites are not considered as viable alternatives for current consideration.

3.3.1.1 Example of Alternative Sites

The Nueces River and Delta were initially included within the boundary as a multi-site NERR. The Nueces Delta was the only site to receive unanimous recommendations at the first site selection meeting. However, the Delta is primarily in private ownership and has been degraded because of freshwater inflow diversion, thus it did not score as highly as the

Mission-Aransas Estuary. The Delta did rank third among all sites considered during the SES ranking. The reasons the Delta was unanimously nominated in the first SSC meeting are compelling. The Delta probably has the most extensive long-term research programs than any where else in the Western Gulf Biogeographic Region. The Delta is also the focal point for restoration projects in the Coastal Bend region. The City of Corpus Christi has spent nearly $5,000,000 to restore freshwater inflow to the Delta by diverting fresh water from the Nueces River to Rankin Bayou, which is the main stem of the Delta. The Coastal Bend Bay and Estuary Program (in partnership with The Nature Conservancy) has nearly $3,000,000 of local (non-Federal) funds to purchase land in the Delta for conservation purposes. Since the Estuary Program recently made its first land purchase, there are wetlands now available in the Delta to include in the Proposed Mission-Aransas NERR. After discussion over the merits of having non-contiguous boundaries in the NERR, the SES agreed to recommend a satellite site in the Nueces Delta using two parcels owned by the State of Texas and the parcel owned by the Estuary Program. Although the SES recommended the Nueces Delta as a satellite site, the Delta was not included in the final site boundary because of its degraded condition, lack of representativeness, and existing water uses.

3.3.1.2 Example of Boundary Alternatives

There are three potential alternatives that can be considered that differ from the preferred alternative.

3.3.1.2.1 Include the Gulf Intracoastal Waterway and Transportation Corridors

The GIWW along with maintenance dredging upland and open water disposal sites and the Copano Bay Bridge right-of-way are excluded from the proposed boundary. The reasons are for the longstanding justification and use of these areas to achieve important transportation needs that are local, regional and national in scope and that require constant maintenance and operation to stay fully functional. Excluding them from the boundary ensures no additional requirements are placed on these facilities such as those associated with a Nationwide Permits (Section 5.2.2.3) affecting a “designated critical resource water”. Including these areas in the boundary would not in any way put a halt to the transportation activities currently taking place but the additional requirements placed on permit applicants like State or Federal agencies could require additional assessment, time to conduct operations, or meet additional mitigation requirements. This may or may not result in a greater level of resource protection, and require additional scientific investigation.

3.3.1.2.2 Extend the Reserve Boundary an additional 1,000 feet to the Mean High Tide Line

The current Reserve boundary and lease stop in most instances 1,000 feet from the mean high tide line (MHTL). The GLO feels that this protects private property owners from the conduction of Reserve research and monitoring activities in areas where property owners are often given permission for the placement of private piers and docks (Figure 13) and thus help to avoid potential conflicts. A number of private property owners have provided special permission for the UTMSI to extend their research should that be desirable and upon notification of the property holder to the MHTL. Consequently, in some selected sites and along with other sites associated with NERR partners, research can be undertaken along the land/water interface sector as needed. This provides UTMSI and associated research partners sufficient core site study areas while allowing GLO to continue to lease and permit nearshore activities. Over time, additional property owners who support the NERR may also give permissions for the conduct of research activities to the MHTL. This alternative would extend the boundary to the MHTL throughout the NERR site. Since uses are not prohibited in the NERR site, the impact would be mostly for the UTMSI to receive permission to conduct related buffer research from individuals or corporations who have facilities in the water and any proposed new uses would be affected at the time of getting a U.S. Army Corps of Engineers permit. NERR sites are “designated critical resource water” and receive additional consideration when applicants seek to obtain a nationwide permit. Piers, for example, are general permits and are not affected by such designation (Section 5.2.2.3).

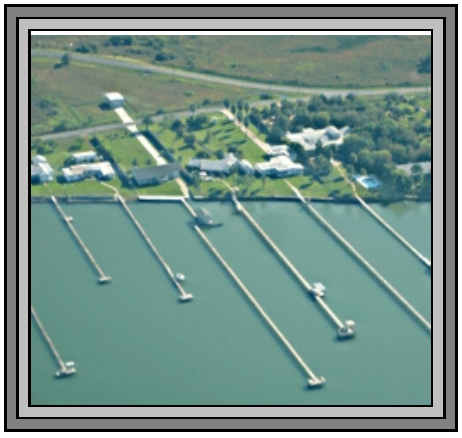

Figure 13. Illustration of piers and docks in a shallow bay that extend almost 1,000 feet offshore.

3.3.1.2.3 Inclusion of Additional Key Land Areas

While it may be desirable to include an entire watershed with complete management control in a NERR site to achieve optimal research results of a pristine ecosystem, there are usually many limitations to achieving such a goal. Reserve sites are limited by the amount of property that can be acquired either through funding limitations, willing sellers, the total size of the ecosystem, and the actual needs for research and management goals. Therefore, there is a great deal of diversity in the size of NERR sites as shown in Table 1. Many NERR sites after initial designation have continued to acquire additional property when such property becomes available. Key areas consist of river or stream corridors or submerged wetlands. The draft MP indicates there are additional wetland and watershed areas that would be acquired should circumstances permit (Attachment A, Section 4.0). Consequently, elements of this alternative remain viable into the future. Additional environmental assessment would be needed with future boundary acquisitions and changes should they occur.

3.4 No Action

Nationally, there are still many sites not represented in the NERRS and Federal funding is potentially a limiting issue. It is possible that in the process of decision making trade-offs may be made for one new site over another. While NOAA provides funding to applicants to undertake a site evaluation process, there are no guarantees that a site will be selected so the no action alternative is considered a viable alternative. Under this option the Mission-Aransas Estuary would not be designated as part of the NERRS or placed on hold and there would be no change in current management of the proposed reserve site. The no action alternative for a Mission-Aransas NERR would leave the publicly-owned lands within the Mission-Aransas Estuary under their current status within: a) the subtidal waters operated by the GLO, b) the Aransas National Wildlife Refuge operated by the USFWS, and c) the Goose Island State Park operated by the TPWD. The no action alternative for a Mission-Aransas NERR would leave the privately-owned lands within the Mission-Aransas Estuary under their current status within: a) Buccaneer Cove Preserve operated by the CBLT, and b) Fennessey Ranch. Under these separate programs, these habitats are managed differently and on a basis as dictated by varying available resources and priorities of the respective agencies involved. Although each major portion of this site would continue to be protected and managed, these efforts would be additionally benefitted by association with a NERR designation and additional funds provided for the conduct of studies, additional acquisitions, etc. The potential pressures for the Fennessey Ranch to subdivide the property for the sale of recreational properties in the absence of a conservation easement would be great (personal communication with S. Crofutt, 11/17/2004) and potentially lead to a change in land use of the existing property.

The designation of the Mission-Aransas NERR would provide a clear alternative to the current management of these lands by bringing these different components of a relatively intact watershed under a single advisory program. This designation would also combine and magnify the resources of each of the main public and private land-holding agencies, as well as those of the other partners for the NERR. The no action option would, therefore, provide for only minimal and incomplete management of these important examples of estuarine and associated non-estuarine habitats. Additionally, there would be the loss of funds, the loss of opportunities for public education, and there would be no Coastal Training program for facilitating science based management. Reserve sites serve to draw many tourists, researchers, and other visitors adding to the positive economic impact in the Reserve area. No action would lead to a forgone opportunity. The many organizations and individuals who provided comments during the scoping meetings in favor of the Reserve would also be disappointed in the no action alternative based on their comments of support.

3.5 Summary of Environmental Consequences of Alternatives

The details regarding all of the predictable environmental consequences of establishing the Mission-Aransas NERR are provided in section 5.0 of this document but are briefly summarized as follows. The environmental impact of establishing the Mission-Aransas NERR will be to coordinate the protection and management of the habitats currently held within the boundaries of the proposed reserve. This action will offset any minor environmental impacts by providing a comprehensive program for the coordinated management of the site. The development of programs in research, monitoring and environmental education will further benefit the site by generating additional scientific knowledge and public support and appreciation for the roles played by these natural areas.

The facilities for the site (Attachment A, Section 7.0) will be built in the designated buffer area and will be placed to minimize adverse impacts to existing habitats and other natural resources. There will be little physical alterations to the present environmental conditions in the Reserve apart from those associated with activities for basic scientific activities

associated with research and monitoring outlined in the Stewardship Plan (Attachment A, Section 5.0). Traditional uses of the site will remain unchanged (Attachment A, Appendix 2) including recreational and commercial fishing (finfish, oyster, shrimp, and crab), recreational hunting, camping, and oil and gas operations.

4.0 THE AFFECTED ENVIRONMENT

This section describes the current Mission-Aransas Estuary and proposed Reserve's habitats. Description of these habitats provides baseline information of the environment for analytical purposes.

4.1 Biogeographic Region Analysis

There are currently 26 sites in the NERRS scattered among 16 of a total of 29 recognized biogeographic subregions of the country. The Texas site will represent the Western Gulf Biogeographic Subregion (Figure 14). The area considered lies wholly in Texas, and comprises most of the Texas coast. The Subregion is bounded by the border with Mexico to the southwest and the border of Galveston Bay to the northeast. This area includes six major bay-estuarine systems and two river systems (Figure 15). The major bay-estuarine systems are Lavaca-Colorado Estuary, Guadalupe Estuary, Mission-Aransas Estuary, Nueces Estuary, and Laguna Madre Estuary. Laguna Madre is actually two different systems: Upper Laguna Madre/Baffin Bay and Lower Laguna Madre. Texas follows the traditional system of naming an estuary for the river(s) that dilute sea water. In NOAA publications, these systems are named after the primary bay (Matagorda Bay, San Antonio Bay, Aransas Bay, Corpus Christi Bay, and Laguna Madre, respectively). The two riverine estuaries are: the Brazos River and the Rio Grande. Three of the ecosystems (Mission-Aransas Estuary, Nueces Estuary, and Laguna Madre Estuary) were included in the Corpus Christi Bay National Estuary Program study area. Redfish Bay, within the Mission-Aransas Estuary, is considered a high priority site for conservation in the Northern Gulf of Mexico by The Nature Conservancy (Beck et al. 2000).

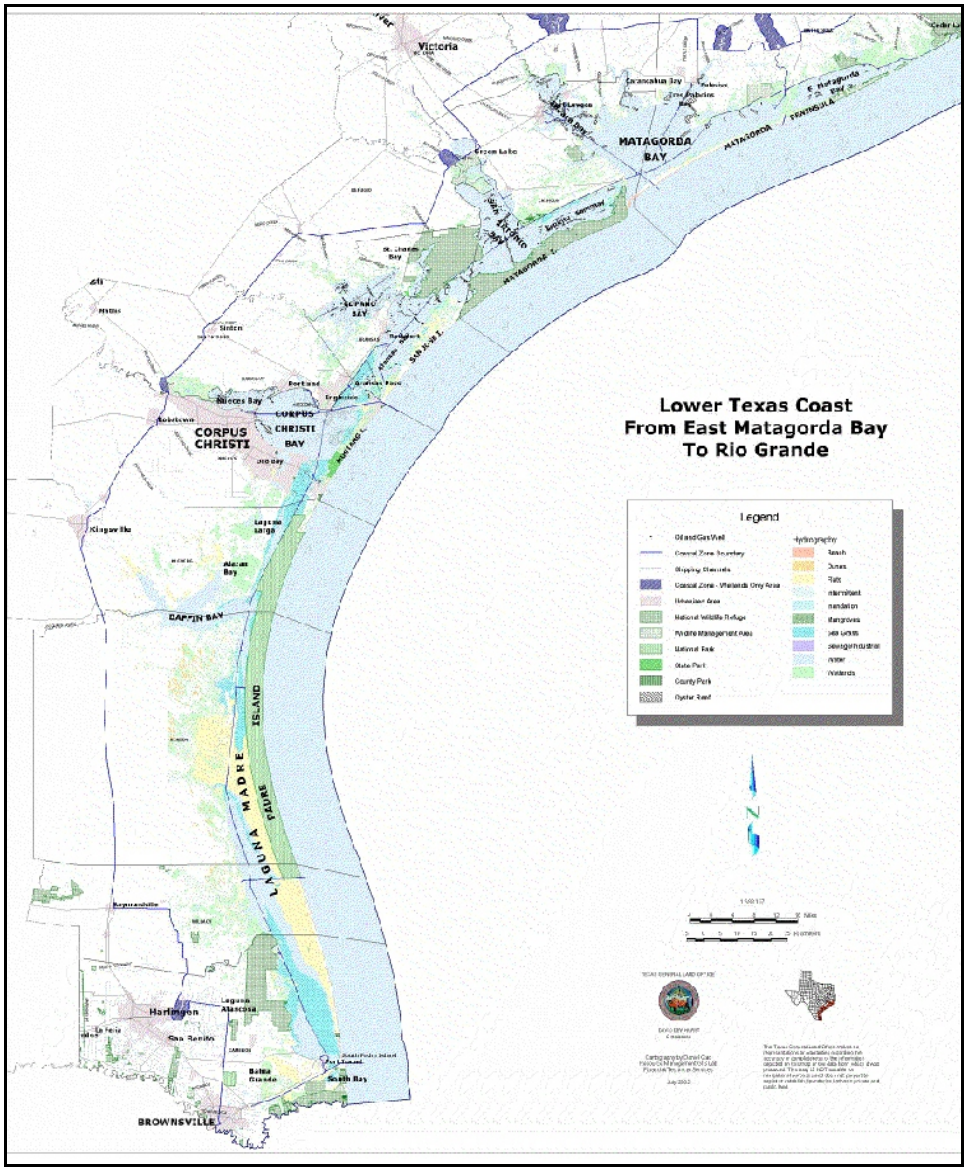

Figure 14. Map of the major estuaries of the Western Gulf Biogeographic Subregion.

4.2 Physical Aspects

The Mission-Aransas Estuary is a typical Western Gulf of Mexico estuary (Diener 1975) (Figure 15). The estuarine system is composed of tertiary, secondary, and primary bays. Mission Bay is the only tertiary bay, and Copano, Port and St. Charles Bay are secondary bays. Mesquite, Aransas and Redfish Bay are primary bays because they are adjacent to the oceanic outlets. Copano Bay is a coastal plain estuary, composed of two drowned river mouths of the Mission and Aransas Rivers. Aransas, Redfish and Mesquite Bays are bar-built estuaries, in which an offshore sand bar partially encloses a body of water. Aransas Bay is the largest bay, followed by Copano and Mesquite Bay. The bay systems are shallow and the mean low water varies from 0.6 m in Mission Bay to 3 m in Aransas Bay (Chandler et al. 1981).

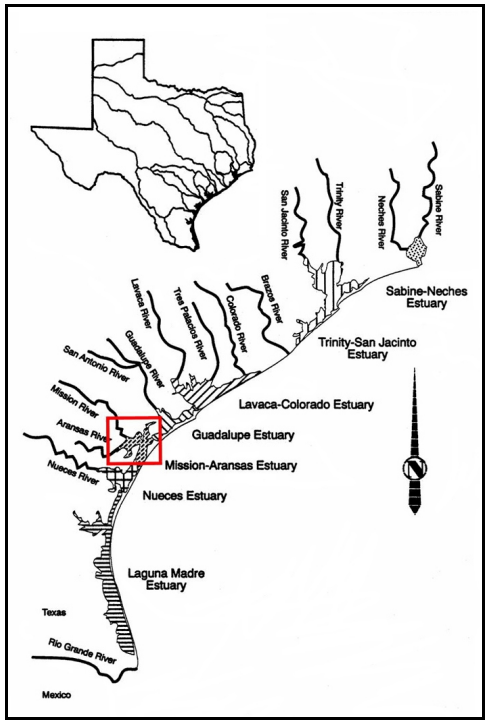

Figure 15. Major estuaries on the Texas Coast.

The land within the Mission-Aransas NERR is comprised of state and privately owned land. The Fennessey Ranch is privately owned and is designed to be environmentally sound as well as an economically viable business. The current economic base incorporates hunting, wildlife tours, photography, and cattle enterprises (Crofutt and Smith 1997). It is composed of native tree/brush, prairie, freshwater wetlands, and Mission River riparian corridor. Wetlands at the Fennessey ranch cover about 500 acres, of which are temporarily, seasonally and semi-permanently flooded (White et al. 1998).

Buccaneer Cove Preserve is located at the mouth of the Aransas River and contains 856 acres of wetlands such as estuarine tidal flats and brackish marshes. This area is owned and managed by the Coastal Bend Land Trust whose primary goals are preserving and enhancing native wildlife habitat in the Coastal Bend. Johnson Ranch is located on Lamar Peninsula adjacent to St. Charles Bay. The Johnson Ranch contains 245 acres of marshland, coastal prairie and oak motte habitat. These are valuable habitats for the whooping cranes, sandhill cranes, reddish egrets and other waterfowl. The state parcel of land in Mission Bay is also comprised of valuable wetland habitat. The Mission Bay state parcel, Buccaneer Cove Preserve, and Johnson ranch add 1159 acres of habitat that is essential to the ecological functioning of the system.

Goose Island State Park is 321.4 acres and is located between Aransas and St. Charles Bay. The state park contains several habitats including live-oak thickets, tidal salt marshes, and mud flats, which support migrant birds including rails, loons, grebes, common goldeneyes, red-breasted mergansers, and redheads. The park also is home to the "Big Tree", which is the national champion Live Oak estimated to be around 2000 years old. The park was acquired in 1931-1935 by deeds from private owners and Legislative Act setting aside the state-owned Goose Island as a state park. The earliest park facilities were constructed by the Civilian Conservation Corps (CCC) in the early 1930s. The park also has a coastal lease of submerged land adjacent to the park that includes seagrass beds and oyster reefs.

The Aransas National Wildlife Refuge (ANWR) is comprised of land on the Black Jack Peninsula (Aransas proper), Tatton Unit (NW of St. Charles Bay) and Matagorda Island. The refuge was established in 1937 to protect the endangered whooping crane and was created through an executive order signed by Franklin D. Roosevelt. Matagorda Island Wildlife Management area and State Park, became part of the ANWR in 1982 and is managed through a memorandum of agreement by Texas Parks and Wildlife Department (TPWD) and U.S. Fish and Wildlife Service (USFWS). The ANWR has a large portion of tidal and deltaic marshes. Upland vegetation is predominately coastal plain grasses interspersed with oak mottes, swales and ponds (Stevenson and Griffith 1946, Allen 1952, Labuda and Butts 1979). Vegetation and wetlands at the refuge support wildlife such as the brown pelican, Attwater's prairie chicken, peregrine falcon, white-tailed deer, javelina, coyote, wild pig, Rio Grande turkey, raccoon, armadillo, and the threatened American alligator (CCBNEP 1996, Figure 16).


Figure 16. American alligator in the ANWR.

4.3 Climate

There are several published accounts pertaining to the climate within the Mission-Aransas NERR and this section is largely based on a wetland conservation plan done by Smith and Dilworth (1999). The proposed site has a "subhumid-to-semiarid east coast subtropical climate, with extreme variability in precipitation" with generally high humidity and infrequent but significant killing frosts (Fulbright et al. 1990). Generally, the area experiences high temperatures along with deficiencies in moisture. Major climatic influences are temperature, precipitation, evaporation, wind, tropical storms and hurricanes.

Temperatures within the Mission-Aransas NERR range from an average winter minimum range of 8.3 - 8.9 ^{o}C to an average summer maximum range of 33.3 - 35.6 ^{o}C. The major impacts of temperature within the proposed site are frosts or freezes. Average annual rainfall ranges from 91.4 cm in the north to 77.4 cm in the south. Annual precipitation values alone are not necessarily significant unless compared with precipitation deficiency caused by evapotranspiration and transpiration from plants (Orton 1996). These deficit values range from 7.6 to 40.6 cm, and coupled with this deficient rainfall budget is the seasonal bimodal distribution of precipitation, with most rainfall occurring in the spring and summer months.

Two principle wind regimes dominate the Mission-Aransas NERR: persistent, southeasterly winds from March through September and north-northeasterly winds form October through March (Behrens and Watson 1973, Brown et al. 1976). Sedimentologists stress the importance of winds affecting coastal processes along the Texas coast, noting that it is perhaps the most important agent that influences coastal development. The strongest winds occur during tropical storms and hurricanes generating high velocity currents which move vast quantities of sediment in relatively short periods of time (Morton and McGowen 1980).

4.4 Hydrography / Oceanography

There are several published accounts pertaining to the hydrography within the Mission-Aransas NERR and this section is largely based on a wetland conservation plan by Smith and Dilworth (1999). Hydrographical conditions in the proposed site are influenced primarily by climatic conditions, freshwater inflow and to a lesser extent tidal exchange. The Mission and Aransas rivers contribute the major freshwater inflows into the Mission-Aransas NERR. All drainages of the Mission-Aransas Estuary share the major Gulf of Mexico connection at Port Aransas (Aransas Pass). Minimum and maximum annual inflows, median inflows, and mean inflows from surface runoff are compared to those of the central Coastal Bend and south Texas in Table 4.

Other hydrological parameters such as precipitation and evaporation, along with inflows, provide a better understanding of the water balance and estuarine salinity levels within the area (Table 5). The Aransas estuary receives most of its inflow from adjacent ungauged areas, with a net positive input of freshwater. A salinity gradient is normally present, where there is decreasing salinity from the Aransas inlet to the upper bays.

Table 4. Comparison of freshwater inflows in acre-feet per year in three estuaries along the lower Texas coast. Data is the estimated annual flows based on values from 1941 - 1991 (http://hyper20.twdb.state.tx.us/data/bays_estuaries/hydrologypage.html).

Estuary	Minimum Annual Inflow	Maximum Annual Inflow	Median Inflow	Mean Inflow
Aransas	7503	1542142	317720	439486
Nueces	42551	2744260	349945	569198
San Antonio	275082	7696573	2067302	366148

Table 5. Comparison of estuarine hydrology in acre-feet for three estuaries along the lower Texas coast. Data is the estimated annual flows based on values from 1941 - 1991 (http://hyper20.twdb.state.tx.us/data/bays_estuaries/hydrologypage.html).

Estuary	Gauged Inflow	Ungauged Inflow	Evaporation	Precipitation	Inflow Balance
Aransas	135537	317193	584038	366667	215209
Nueces	522430	194855	659314	331996	241881
San Antonio	2009889	435961	642512	435707	2159344

Tidal exchange in the Mission-Aransas Estuary is driven by astronomical tides, meteorological conditions, and density stratification (Armstrong 1987). Because of shallow bay depths (1 - 4 m at mid-tide) and a relatively small tidal prism, wind exerts a much greater influence on bay circulation than astronomical tides (Morton and McGowen 1980, Armstrong 1987, NOAA 1990a). Substantial exchange of water between the Gulf of Mexico and the Mission-Aransas Estuary occurs from wind-generated tides (Ward 1997). Astronomical tides are predominantly diurnal, but also have a semi-diurnal component. The greatest influence on the bay system by astronomical tides is at the tidal inlet. Seasonal high tides occur during the spring and fall, while seasonal lows occur during winter and summer.

This estuarine system has a large salinity gradient, with high salinities in Redfish Bay to lower salinities in Mission Bay. Salinity gradients occur with low salinities at the mouth of the Aransas and Mission Rivers, to higher salinities at the primary bays. Salinity structure within the proposed site is determined by "isolated freshwater pulses that, once introduced are retained within the system" (NOAA 1993). Freshwater pulses tend to lower salinities for long periods of time because of the shallowness of the bay and the restricted inlet connection. Salinity stratification is common following fresh water impulses and usually occurs in Copano Bay (NOAA 1993). Salinity stratification can occur in secondary bays (e.g., Aransas Bay), in summer when winds subside and evaporation causes dense water to sink (Morehead et al. 2002).

4.5 Geology

The shorelines of Copano and Aransas Bay are in a state of erosion; whereas the bay side shoreline of San Jose is in a state of equilibrium or accretion (Chandler et al. 1981). The Mission/Aransas estuary system is in an intermediate stage of geological succession with the final stage being the filling of the estuary by riverine deposits. There are three sources of sediment in the proposed site: 1) suspended and bedload material from the Mission and Aransas rivers, 2) Gulf of Mexico deposits from storms and inlets, and 3) dredge spoil from channels (Tunnell et al. 1996). The most common sediment type in the Mission/Aransas estuary is mud, which is comprised of silt and clay (White et al. 1983). Mesquite Bay and St. Charles Bay most common sediment type is sand to sandy silt (White et al. 1989). Aransas, and northern Copano Bay have a higher portion of clay, while the southern portion of Copano Bay has a higher portion of silt. Copano Bay also has areas were the sediments have as high as 75% shell material occurring near oyster reefs. The margins of Copano and Aransas Bay have a higher percentage of sand (White et al. 1983).

Along the southern Texas coast, growth faults occur sub-parallel to the coast. Most faults along the southern Texas coast are down-to-the-basin, but up-to-the-basin are common (McGowen and Morton 1979). These faults belong to the Willamar system (McGowen and Morton 1979, CCGS 1967). Faulting is concentrated outside the proposed boundary on South Padre Island (Rio Grande - Port Mansfield Ship Channel), Mustang Island (Malaquite Beach - Port Aransas), Brazos-Colorado Delta (Colorado River - Bolivar Peninsula), and near Sabine Pass (McGowen and Morton 1979). Faulting is a result of structural activity, and gravity sliding, motile salt beds, or basin subsidence are suspected to be the causes of Gulf coast faults (McGowen and Morton 1979, Link 1982). On the southern Texas coast, most oil and gas reservoirs are hydrocarbon traps associated with down-to-the-basin gravity faults and related closures to their down thrown sides (Brown et al. 1976). On the south Texas coast, the principal accumulations of hydrocarbons are associated with major or concentrated fault zones (CCGS 1967). These hydrocarbon reservoirs are, in general, shallow water sands (CCGS 1967).

4.6 Water Quality

Concerns about the quality of the Aransas-Copano-Mission bay system has risen more recently than for the urbanized and industrialized bays on the upper Texas coast. Up to World War II, there were few reports or indications of perceived

pollution problems in the area, in contrast to the upper coast. In the last two decades, public attention and concern for the Aransas-Copano Bay system has changed. With accelerating urban development, awareness of the potential impacts on the system has increased, and maintenance of the health of the system has become a major issue (Smith and Dilworth 1999). Nuisance and toxic blooms are observed, but hypoxia is not. Nitrogen and phosphorus concentrations range from low to medium (Table 6) (NOAA 1977). Ambient nutrient concentrations are important factors in determining agricultural pollution via runoff. Nitrogen is the primary limiting nutrient to Texas estuaries and is supplied to the Mission-Aransas Estuary by the Aransas and Mission rivers (24%), and precipitation (28%). The final nutrient concentration, however, is determined more by the estuarine processes than by inputs to the system. The processes being geochemical trappings within sediments, regeneration by biological communities, and benthic-pelagic coupling (Tunnell et al. 1996). Sewage treated water from the City of Rockport is used as irrigation at the Rockport Country Club Golf Course and is released into Tule Creek, which flows into Little Bay.

Table 6. Predicted annual pollutant loads to Copano and Aransas Bay (Smith and Dilworth 1999).

Stream Outlet Point	Total Phosphorus (kg/yr)	Total Nitrogen (kg/yr)	Total Cadmium (kg/yr)	Fecal Coliform (trillion col./yr)
Copano Creek	9320	67152	45.4	941
Medio Creek	60594	369122	173.5	1469
Mission River	57781	239843	76.8	550
Aransas River	60900	213314	56.1	503
Chiltipin Creek	19524	66252	15.3	43
Aransas Sub-Basin*	138205	519409	148.2	1099
Copano Bay*	208119	955683	367	3509

*Note: The Aransas Sub-Basin entry represents a sum of the Aransas River, Chiltipin Creek, and Taft Drainage entries. The Copano Bay entry represents the sum of all five major outlets to the bay.

The Texas Commission on Environmental Quality (TCEQ) tests the water quality of all water bodies on the Texas Coast as required by the Clean Water Act. The TCEQ applies Texas Surface Water Quality Standards to determine which water bodies are impaired. Bodies of water can be designated impaired because of low dissolved oxygen levels, high bacteria concentrations, high mercury concentrations, and many other conditions. Once a body of water is determined impaired a Total Maximum Daily Loads (TMDLs) is scheduled by TCEQ for priority impaired waters. There is one segment in the Mission-Aransas Estuary that is listed as impaired (2002, 303(d) List). The TCEQ segment 2472 entailing Copano Bay, Port Bay, and Mission Bay is impaired by bacteria and does not support oyster use. The locations of impairment include the area along southern shoreline, Port Bay, and the area near the town of Bayside. This segment of the proposed site is listed as a low urgency for a TMDL. Even though there are areas in the proposed site that are impaired by bacteria, the Mission-Aransas Estuary has a small area of impairment in comparison to other estuarine systems along the Texas coast (Table 7). There is also impaired waters along the Gulf coast (including Port Aransas area). These waters have shown high concentrations of mercury in king mackerel greater than 43 inches, and this impairment is listed as a high priority of a TMDL (http://www.tnrcc.state.tx.us/water/quality/305_303.html).

Table 7. Number of segments in Texas estuaries listed as impaired by the TCEQ in 2002.

Estuarine System	Number of Segments	Parameters
Trinity-San Jacinto	14	bacteria, dioxin, low DO
Lavaca-Colorado	5	bacteria, low DO, mercury
Guadalupe	1	bacteria
Mission-Aransas	**1**	**bacteria**
Nueces	3	bacteria, low DO, zinc
Laguna Madre	1	low DO

4.7 Habitat Types and Descriptions

Along with open-water habitats, the Mission-Aransas NERR includes several types of wetlands: freshwater (palustrine), brackish, and salt marshes, and mangrove communities. The wetland and open water habitats also support benthic and nektonic populations, as well as large areas of oyster reefs. Large areas of seagrass are present in southern boundaries of the site, and mangroves are abundant in the northern boundaries. Beach and flat habitats are located along the ocean side of Matagorda Island. Several maritime forests are also located within the Mission-Aransas NERR including coastal prairies, oak mottes, and riparian woodlands. All these habitats support endangered and culturally important species, such as shrimp and fish. Further information on habitats, significant species, and archaeological sites within the proposed NERR boundary is given in the following sections.

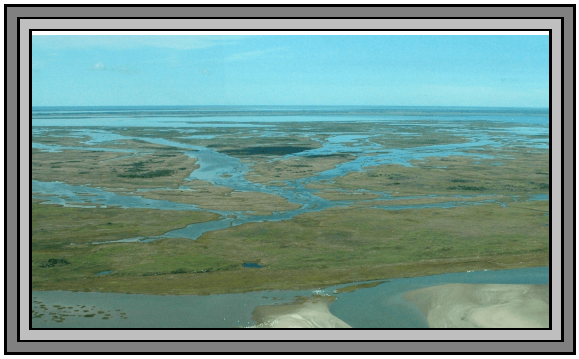

Figure 17. Image of typical estuarine marshes.

4.7.1 Coastal Marshes

Coastal marshes are important habitats that support diverse communities of producers, decomposers, and consumers. There are two types of coastal marshes within the Mission-Aransas NERR: deltaic and tidal marshes (Figure 17, 18). Deltaic marshes occur where there is riverine freshwater and sediment flows, and are found at the Nueces (Rincon Bayou), Mission and Aransas river delta plains (Brown et al. 1976). Tidal marshes occur on flood-tidal deltas near natural passes and along bay shorelines, and are found on the bay side of Matagorda, St. Joseph, and Harbor Islands (Tunnell et al. 1996). There are also marshes exhibiting both characteristics of a deltaic and tidal marsh that have developed between bay-estuary-lagoon system passes at Harbor Island, Cedar Bayou, Redfish, Aransas, Mission and Copano Bay (Brown et al. 1976). Harbor Island is the largest tidal-deltaic marsh in the Mission-Aransas NERR, followed by Cedar Bayou. Wetland plant composition and abundance in deltaic and tidal marshes are controlled by salinity ranges, which break the marsh into three community types: salt, brackish and freshwater marshes. The motility of fish and birds

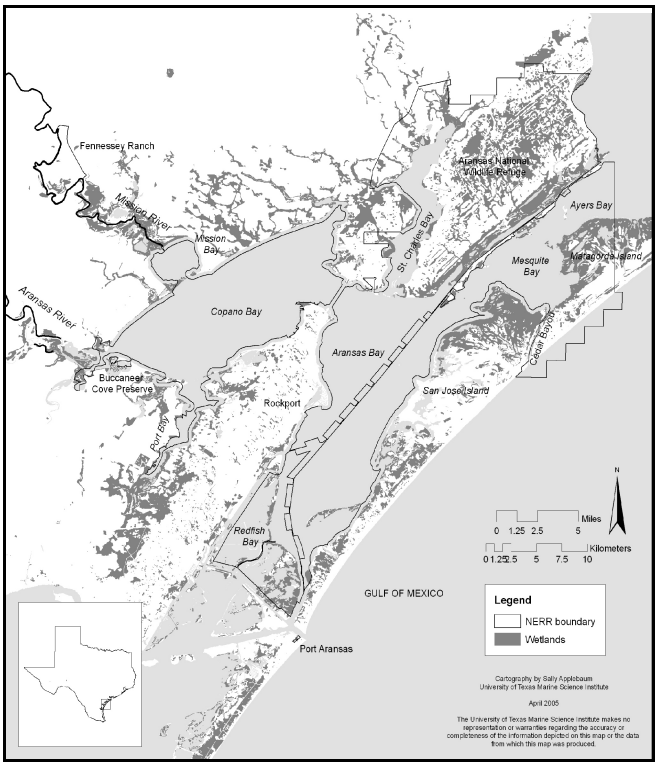

Figure 18. Location of coastal marshes in the Mission-Aransas NERR.

results in the absence of zonation patterns of these organisms within the three marsh types.

4.7.1.1 Salt Marsh

Salt marshes receive daily tidal innundation and typically maintain a salinity between 20 and 35 psu (Tunnell et al. 1996). Producers inhabiting low salt marshes, at low elevations, are dominated by monotypic stands of smooth cordgrass (*Spartina alterniflora*) (Brown et al. 1976). In addition to smooth cordgrass in the low marsh, salt marshes along bay margins also have *Batis maritima*, *S. bigelovii*, S. *perennis*, *S. spartinae*, and *Distichlis spicata* at higher elevations (Brown et al. 1976). In addition to smooth cordgrass in the low marsh, salt marshes along the back side of St. Joseph, and Matagorda Island also have *B. maritima*, *Borrichia* sp., *Monanthochole* sp., *Suaeda* sp., and *Distichlis spicata* at higher elevations (Brown et al. 1976). Among others, consumers typically include the salt-marsh periwinkle (*Littorina irrorata*), fiddler crabs (*Uca pugnax*), and the clapper rail (Stewart 1951, Kerwin 1972, Tunnell et al. 1996).

4.7.1.2 Brackish Marsh

Brackish marshes receive seasonal tidal innundation, storm surges, and typically maintain a salinity between 5 and 19 psu (Tunnell et al. 1996). Brackish marshes are found in tidal creeks and tributaries of Port Bay. The producers in brackish marshes are usually composed of coastal sacahuista, marshhay cordgrass, big cordgrass, bulrush and cattail (Brown et al. 1976). Among others, consumers typically include the ribbed mussel (*Geukensia demissa*), salt-marsh periwinkle (*Littorina irrorata*), fiddler crabs (*U. minax*), Virginia rail (*Rallas limicola*), and the king rail (*Rallas elegans*) (Stewart 1951, Kerwin 1972, Tunnell et al. 1996).

4.7.1.3 Freshwater Marsh

Freshwater marshes receive tidal innundation only during extreme storm surges such as hurricane, which increase water levels but may not change salinity levels (0 - 0.5 psu) (Tunnell et al. 1996). Freshwater marshes are found in the Mission Delta, on Fennessey Ranch (Fennessey Flats), and along the Aransas, and Mission Rivers. The producers in freshwater marshes are composed of rushes, bulrush, cattail, and slough grass (Brown et al. 1976). A large 200 acre freshwater lake, McGuill Lake, is also found on the Fennessey Ranch. Among others, consumers found in freshwater marshes typically include *Melampus bidentatus*, Virginia rail (*Rallas limicola*), and the king rail *(Rallas elegans*) (Stewart 1951, Tunnell et al. 1996).

4.7.2 Open-water Habitats

Open-water habitats for the Mission-Aransas NERR include benthos, both infauna and epifauna, oyster reefs, and seagrass. All of these habitats provide food and shelter for not only benthos, but also plankton, nekton, birds, and mammals.

4.7.2.1 Benthos

Macrobenthic infauna are organisms that live within the sediment and are composed of organisms such as nematodes, polychaetes, molluscs, and crustaceans. Macrobenthic infauna (> 0.50 mm) are dominated by polychaetes and mollusk assemblages in most estuarine systems. Historical studies indicate that in the Mission-Aransas Estuary, the polychaetes *Mediomastus californiensis* and *Streblospio benedicti* are the most abundant macrobenthic organisms (Montagna, unpublished data). Combined together, the abundance of these species has a range of 800 - 2500 *n* m^{-2} in Aransas Bay and 180 - 5000 *n* m^{-2} in Copano Bay (Holland et al. 1975, Armstrong 1987). Historical studies indicate that within Aransas Bay, the polychaete *Praprionospio pinnata* is the most dominant macrobenthic organism, and in Copano Bay the dominant polychaete species are *Glycinde solitaria* and *P. pinnata*. The open bays in the proposed site dominate is small bivalves, which typically represent two-thirds of the molluscan community (Montagna and Kalke 1995). In Copano Bay the dominant epibenthos are *Macoma mitchelli* and *Mulinia lateralis* (molluscs), and *Lepidactylus sp.* (crustacean) (Calnan et al. 1983, Tunnell et al. 1996). The small bivalve *M. lateralis* is a primary food source of the commercially fished black drum (Montagna and Kalke 1995).

Epibenthos are invertebrates that live on the surface of the sediment and include organisms such as shrimp, crabs, and molluscs. Epifauna densities range from less than 1 to over 100 organisms per square meter (Montagna et al. 1998). They are an important group of organisms because they are a high trophic level, and are the primary consumers of macrobenthic infauna. Molluscan epifauna common to the proposed site include species such as whelks, murexs, quahogs, conchs, and scallops. Epifauna also contains economically important species that are commercially harvested such as shrimp and

crabs. The shrimp species in the proposed site that are harvested include the brown, pink, and white shrimp. These species can be found in high abundances throughout the bays and support a large shrimping industry, which is discussed later in under the heading "recreational and commercial fishing." Blue crabs (*Callinectes* sp.) are one of the more abundant brachyuran crabs found in the bays and are most abundant during spring and summer (Hammerschmidt 1985, Britton and Morton 1989). One of the reasons blue crabs are so abundant in the proposed site are because the adults are tolerant of environmental extremes (1-27 ppt, 10-35 ^{o}C), which is typical of Texas bays (Britton and Morton 1989). Blue crabs are active foragers during the day and night, and is also a major predator of estuarine infauna (Britton and Morton 1989).

Salinity is the primary factor in determining distribution of benthos. There are three zones defined in the south Texas estuarine systems: freshwater zone, and estuarine zone and a marine zone (Kalke and Montagna 1984). The freshwater zone resides in the upper portion of the estuary that receives the most freshwater inflow. The estuarine zone occurs when the freshwater inflow and saltwater are mixed, creating intermediate salinities. The marine zone resides near the outlets of an estuary, where salinities approach those of an open ocean.

4.7.2.2 Oyster Reefs

Oyster reefs within the Mission-Aransas NERR are concentrated in Copano, Aransas and Mesquite Bay (Figure 19). The reef structure is usually long and narrow orientating perpendicular to prevailing water currents or parallel to channels, and has a tendency to grow out at a right angle from shore in order to maximize feeding and waste removal (Price 1954). Oyster reef development is dependent on hydrological variables such as salinity, water temperature, current flow, dissolved oxygen levels, and sedimentation. *Crassostrea virginica* is the primary species creating the oyster reefs in the Mission-Aransas NERR and is found in bays with a salinity range of 10 - 30 psu. Mean salinities for Aransas Bay range from 10 - 20 psu and 10 - 15 psu in Copano Bay (White et al. 1989). A thin algal film usually forms on the surfaces of oyster reefs and provides an additional source of primary production to consumers that live in the reef habitat (Bahr and Lanier 1981). Invertebrates are the most abundant consumers associated with oyster reef habitats. Of these invertebrates, arthropods, such as amphipods, brachyuran crabs, and caridean shrimp are the most abundant. Molluscs, aside from *C. virginica*, also inhibit the reefs with the dominant species are *Odostomia impressa* and *Ischadium recurvum* (Calnan et al. 1983). Oyster reefs are also one of the substrates that is most frequented by the commercially viable fished redfish *Sciaenops ocellatus* (Miles 1950). Birds are also primary consumers of oyster reefs (A. Drumright, unpubl. data), and feral hogs have also been reported using oyster reefs as crossings during low tides and they appear to forage as they cross (McAlister and McAlister 1993).

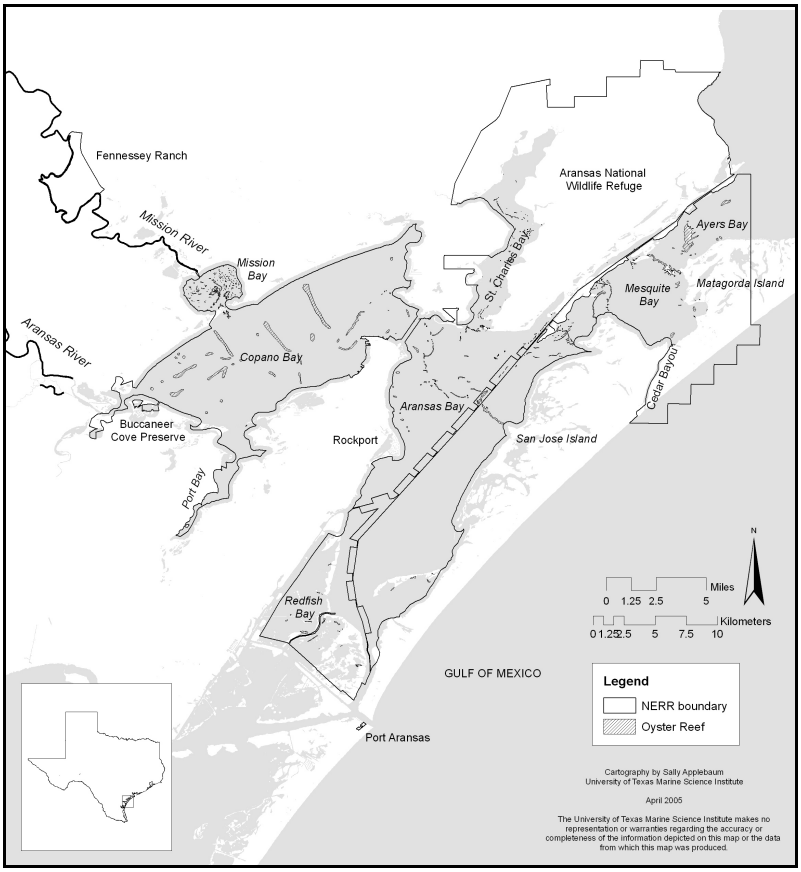

Figure 19. Location of oyster reefs in the Mission-Aransas NERR.

4.7.2.3 Seagrass

Seagrass beds are critical coastal nursery habitat for estuarine fisheries and wildlife. They are also direct food sources for fish, waterfowl, and sea turtles, as well as major contributors of organic matter to estuarine and marine food web. Seagrass beds can act as stabilizing agents for coastal sedimentation and erosion, and also biological indicators of water quality and ecosystem health. Harbor Island and Redfish Bay contain the one of the most extensive area of pristine seagrass beds and comprises 6% abundance of all Texas seagrass (57 km^2) (Table 8) (Pulich et al. 1997; 1999) (Figure 20). The TPWD currently operates a Seagrass Conservation Management Plan. Redfish Bay was established as a scientific area under this conservation management plan.

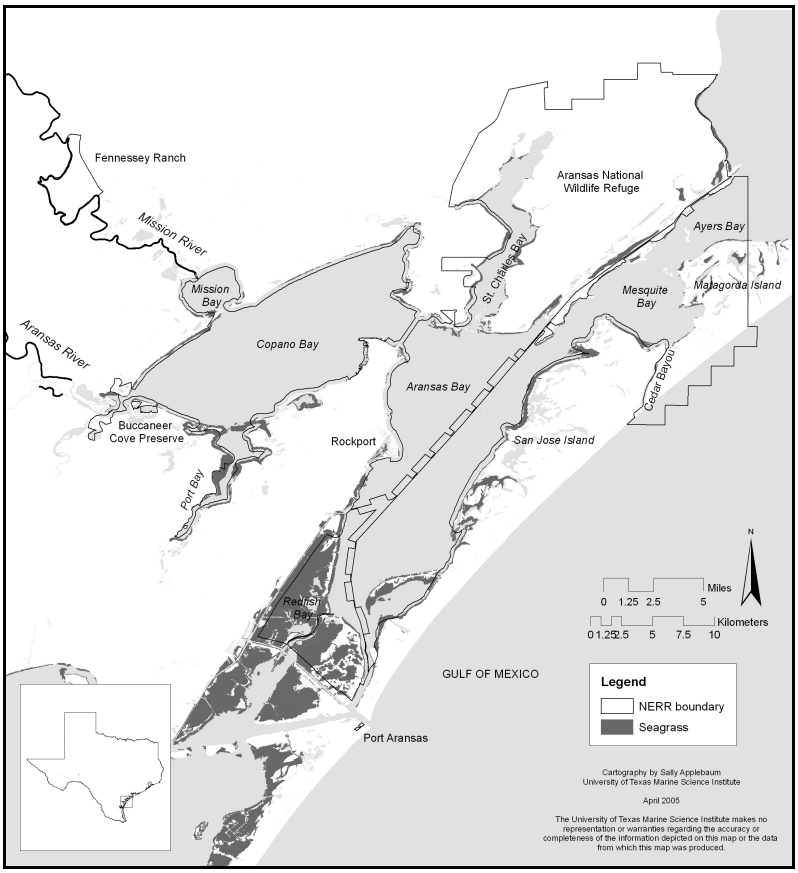

Figure 20. Location of seagrass beds in the Mission-Aransas NERR.

Table 8. Current status and trends in seagrass at proposed site (Pulich et al. 1999).

Bay System	Current Acreage	Percent of Coastwide	Species*	Trends
Copano	8000	3.4	Hd, Rup	
St. Charles			Hd, Rup	
Aransas			All five	
Nueces	24600	11.2	Hd, Rup	Fluctuates with inflow
Corpus Christi			All five	Acreage stable, some bed fragmentation
Redfish			All five	

*Hd - Halodule, Rup = Ruppia, Hph = Halophile, Th = Thalassia, Syr = Syringodium

4.7.2.4 Plankton

Open-water habitats of the estuaries are subtidal and unvegetated, in which case primary production is dominated by phytoplankton. The phytoplankton community in the northern portion of the Mission-Aransas Estuary is dominated by blue-green and green algae, while the southern portion of the estuary is dominated by diatoms (Holland et al. 1975, Tunnell et al. 1996). In Aransas Bay, *Coscinodiscus sp.* is the dominant genera (Freese 1952). Average chlorophyll concentrations for the Mission-Aransas Estuary are 3.1 μg/L (Powell and Green 1992). High chlorophyll concentrations are found near Aransas Pass and Cedar Bayou gulf exchanges which may be caused by nutrient additions from adjacent estuaries (Powell and Green 1992). In Aransas Bay, the minimum abundance during summer is 6 cells/mL and the maximum abundance during the winter is 381 cells/mL (Armstrong 1987).

As principal consumers of primary production, zooplankton are abundant in open-water habitats. The dominant zooplankter in Mission-Aransas Estuary is the calanoid copepod *Acartia tonsa*, with 40 - 60% of total zooplankton abundance (Holland et al. 1975, Tunnell et al. 1996). Freshwater inflows have a large positive effect on zooplankton abundances in the Mission-Aransas and Nueces estuaries because these estuaries receive little inflow in terms of bay volumes (Powell and Green 1992).

4.7.2.5 Nekton

Fish are the dominant secondary consumers and constituents of the nektonic community (Table 9). The dominant nekton species of Aransas Bay, based on a seven year study, are Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), bay anchovy (*Anchoa mitchilli*), hardhead catfish (*Arius felis*), pinfish (*Lagodon rhomboides*), and sand seatrout (*Cynoscion arenarius*) (Moore 1978). The TPWD has had a continuous monthly monitoring programs in place since 1977. Thus, an enormous amount of data is available for nekton.

Table 9. Abundance of estuarine species in Aransas and Corpus Christi Bay. Values are relative abundance of adults or juveniles in any salinity zone, in any month (Nelson et al. 1992).

Species	Aransas Bay	Corpus Christi Bay
Bay scallop	rare	rare
American oyster	low	low
Common rangia	rare	rare
Hard clam	low	low
Bay squid	low	low
Brown shrimp	high	high
Pink shrimp	low	low
White shrimp	medium	medium
Grass shrimp	medium	high
Blue crab	high	high
Gulf stone crab	low	low
Bull shark	low	low
Tarpon	rare	rare
Gulf menhaden	medium	medium
Gizzard shad	rare	low
Bay anchovy	high	high
Hardhead catfish	medium	medium
Sheepshead minnow	medium	medium
Gulf killifish	medium	low
Silversides	medium	medium
Snook	rare	rare
Bluefish	rare	rare
Crevalle jack	low	low

Species	Aransas Bay	Corpus Christi Bay
Florida pompano	low	low
Gray snapper	rare	rare
Sheepshead minnow	low	low
Pinfish	medium	medium
Silver perch	low	low
Sand seatrout	low	medium
Spotted seatrout	low	low
Spot	medium	medium
Atlantic croaker	medium	medium
Black drum	low	low
Red drum	low	low
Striped mullet	medium	medium
Code goby	low	low
Spanish mackerel	rare	rare
Gulf flounder	rare	rare
Southern flounder	low	low

4.7.3 Terrestrial Habitats

Terrestrial habitats within the Mission-Aransas NERR include coastal prairies, oak mottes, spoil islands, riparian woodlands, tidal flats, and mangroves. All of these habitats provide shelter and food for many significant flora and fauna.

4.7.3.1 Coastal Prairies

There are four types of coastal prairies in the Mission-Aransas NERR: 1) cordgrass prairie with gulf cordgrass (*Spartina spartinae*) and marshhay cordgrass (*Spartina patens*); 2) sand mid-grass prairie with seacoast bluestem and panamerican balsalmscale (*Elyonurus tripsacoides*); 3) clay mid-grass prairie with little bluestem (*Schizachyrium scoparium*) and trichloris (*Chloris pluriflora*); and 4) short-grass prairie with sliver bluestem (*Bothriochloa saccharoides*), buffalo grass (*Buchloe dactyloides*), and trichloris as dominants. Usually clumps of mesquite (*Prosopis glandulosa*), oak (*Quercus* sp.), huisache (*Acacia farnesiana*), and prickly pear cactus (*Opuntia lindheimeri*) are found in any these coastal prairies (McLendon 1991, Chaney et al. 1996).

4.7.3.2 Tidal Flats

Wind-tidal flats are found along the bay sides of San Jose Island (Figure 21), deltas of the Mission and Aransas Rivers, and scattered along the bay margins of Copano and Redfish Bay (Withers and Tunnell Jr. 1998, Brown et al. 1976, Morton and McGowen 1980) (Figure 22). Wind-tidal flats are halophilic ecosystems generally inundated by wind and storm tides and are found at elevations between mean sea level (MSL) and 1 m above MSL. Wind-tidal flats major primary producers are mats of filamentous blue-green algae that support a large array of consumers of the blue-green algae. These flats are one of the most significant feeding

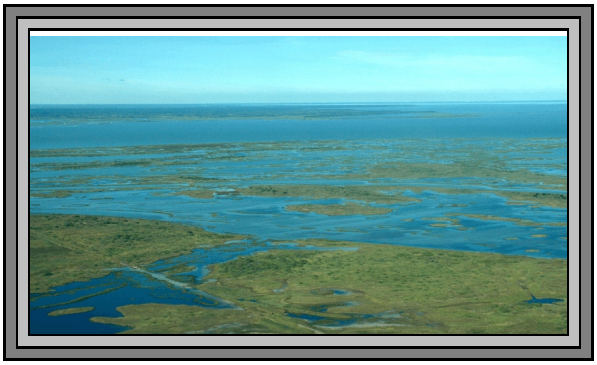

Figure 21. Image of tidal flats in the Mission-Aransas NERR.

areas for aquatic bird life on the Gulf coast. Tidal flats also act as flood basins which protect vegetation in adjacent bay habitats (Withers and Tunnell Jr. 1998).

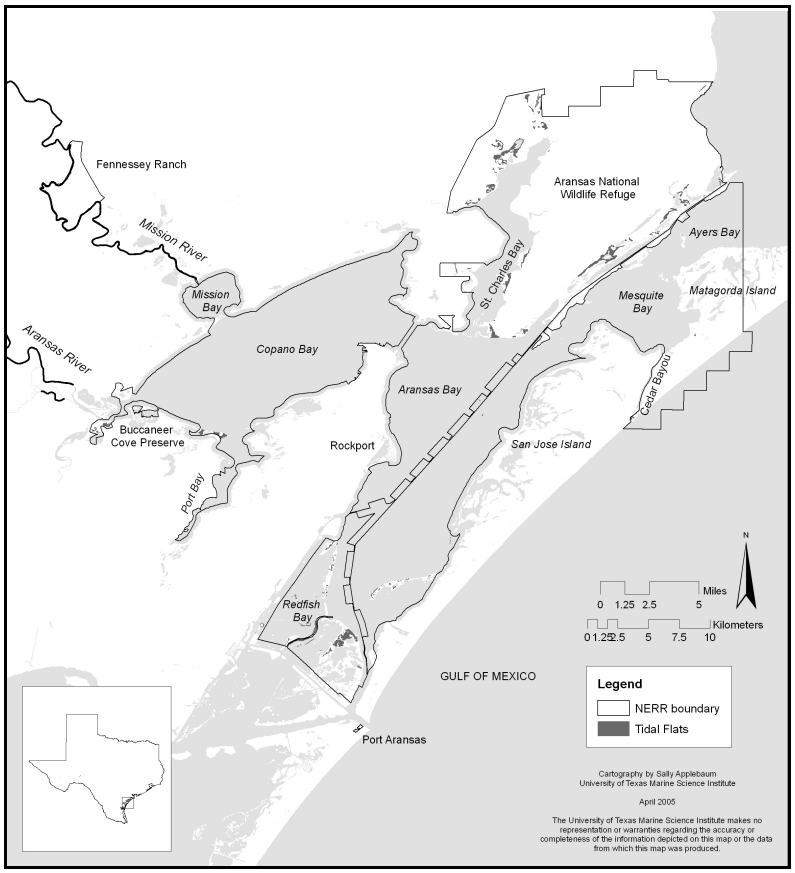

Figure 22. Location of tidal flats in the Mission-Aransas NERR.

4.7.3.3 Mangroves

The black mangrove (*Avicennia germinans*) is the primary mangrove found in the Coastal Bend (Figure 23). Dense stands of black mangrove are found on Harbor Island in Redfish Bay and dominants approximately 600 hectares on this island. Black mangroves are also found in scattered stands on bay margins and islands in Redfish and Aransas Bay as well as along Matagorda and St. Joseph Island (Sherrod 1980) (Figure 24). Black mangrove stands are usually interspersed with *Spartina* spp., *Salicornia* spp., and *Batis* spp. (Sherrod and McMillian 1981). Seasonal freezes are the largest threat to black mangroves. A large freeze in 1989, decreased abundance of black mangrove stands, but since then populations have recovered (Everitt et al. 1996).

Figure 23. Image of mangrove stand in the Mission-Aransas NERR.

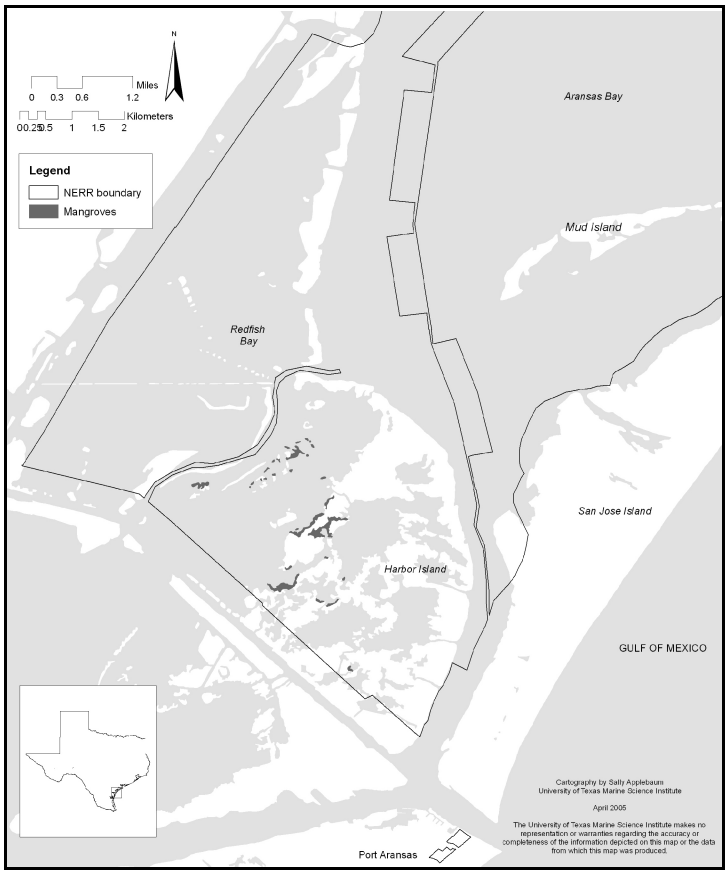

Figure 24. Location of mangroves in the Mission-Aransas NERR.

4.7.3.4 Other Terrestrial Habitats

Oak mottes are isolated groves of live oaks (*Quercus virginiana*) that exist as remnants of oak forests that occurred on sand sheets and barrier islands (Figure 25). These mottes are interspersed with little bluestem, yaupon (*Ilex vomitoria*), beautyberry (*Callicarpa americana*), greenbriar (*Similax* sp.), mustang grape (*Vitis mustangensis*), and muscadine (*Vitis rotundifolia*) (Chaney et al. 1996).

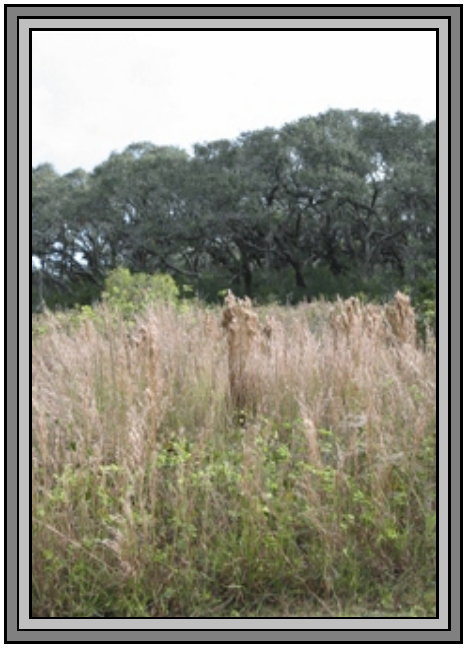

Figure 25. Oak motte within the Mission-Aransas NERR.

Natural and dredged spoil islands are also present in the Mission-Aransas NERR (Figure 26). These islands are ideal nesting for several species of birds and usually contain plant communities of mesquite, salt cedar (*Tamarix* spp.), popinac (*Leucaena leucocephala*), granjeno (*Celtis laevigata*), and oleander (*Oleander* spp.) (Chaney et al. 1996).

Figure 26. Spoil island within the Mission-Aransas NERR.

Riparian woodlands are found along rivers and streams and are important stopovers for migrating birds (Figure 27). These woodlands are communities of tall trees with a dense to sparse understory. The understory is usually dwarf palmetto (*Sabal minor*) and common trees are: anaqua (*Ehretia anacua*), cedar elm (*Ulmus crassifolia*), live oak, sugar hackberry (*Celtis laevigata*), net-leaf hackberry (*Celtis retuculata*), Mexican ash (*Fraxinus berlandieriana*), and black willow (*Salix nigra*) (Chaney et al. 1996).

Figure 27. Riparian habitat found along the Mission River.

4.8 Significant Fauna and Flora

4.8.1 Birds

Birds are high level consumers of open-water habitats. Waders such as the great blue heron (*Ardea herodias*), reddish egret (*Egretta rufescens*), great egret (*Casmerodius albus*) and the tricolor heron (*E. tricolor*) frequent the peripheral areas of the bays. Floating and diving birds such as cormorants, loons, gulls, terns, and grebes feed on fish in the bays, while ducks such as the lesser scaup (*Aythya affinis*), redhead (*A. americana*), and ruddy duck (*Oxyura jamaicensis*) feed on benthic fauna and submerged vegetation (Tunnell et al. 1996). A common bird of prey to the Mission-Aransas area is the osprey (*Pandion haliaetus*), which nests along the shorelines and feed off fish from the open-water habitats (Armstrong 1987).

4.8.2 Mammals

The only resident mammal in the open-water habitat within the estuaries is the Atlantic bottlenose dolphin (*Tursiops truncatus*). This species is most frequently found in the Aransas Pass, shallow areas inside barrier islands and near shorelines (Barham et al. 1979). The winter populations in the area are often twice the size of the summer populations and are known to move against ebb and flood tides (Shane 1980).

4.8.3 Endangered Species

The Texas Parks and Wildlife Department (TPWD) and the U.S. Fish and Wildlife Service (USFWS) provided lists of threatened and endangered species that may occur in the Reserve. Table 10 lists Federally and State-endangered species and species of concern (SOC) that may occur in region of the Reserve. Species listed by the USFWS have confirmed sightings in Nueces, Refugio, Aransas, San Patricio, or Calhoun County. Statewide or area-wide migrants are also included. Inclusion in the list does not imply that a species is known to occur in the Reserve, but only acknowledges the potential for occurrence. State-endangered or threatened and federally- and state- listed SOCs have no legal status under Federal law and are not protected under the Endangered Species Act, however they are presented in this environmental impact statement.

Table 10. Listed species of concern, and endangered and threatened species within the proposed NERR site. USFWS[1] = US Fish and Wildlife Service, TPWD[2] = Texas Parks and Wildlife Department.

Common Name	Scientific Name	USFWS	TPWD
Plants			
South Texas ambrosia	*Ambrosia cheiranthifolia*	E	E
Lilia de los llanos	*Echeandia chandleri*	SOC	
Texas windmill-grass	*Chloris texensis*	SOC	
Black lace cactus	*Echinocereus reichenbachii var. albertii*	E	E
Slender rush-pea	*Hoffmannseggia tenella*	E	E
Welder machaeranthera	*Psilactis heterocarpa*	SOC	
Thieret's skullcap	*Scutellaria thieretii*	SOC	
Roughseed sea-purslane	*Sesuvium trianthemoides*	SOC	
Fish			
Opossum pipefish	*Microphis brachyurus*		T
Amphibians			
Sheep frog	*Hypopachus variolosus*		T
Black-spotted newt	*Notophthalmus meridionalis*	SOC	E
Rio Grande lesser siren	*Siren intermedia texana*	SOC	E
Reptiles			

Common Name	Scientific Name	USFWS	TPWD
American alligator	*Alligator mississipiensis*	TSA	
Loggerhead sea turtle	*Caretta caretta*	T	E
Texas scarlet snake	*Cemophora coccinea lineri*		T
Green sea turtle	*Chelonia mydas*	T w/CH‡	T
Leatherback sea turtle	*Dermochelys coriacea*	E w/CH‡	E
Indigo snake	*Drymarchon corais*		T
Speckled racer	*Drymobius margaritiferus*		E
Hawksbill sea turtle	*Eretmochelys imbricata*	E w/CH‡	E
Texas tortoise	*Gopherus berlandieri*		T
Kemp's Ridley sea turtle	*Lepidochelys kempii*	E	E
Northern cat-eyed snake	*Leptodeira septentrionalis septentrionalis*		E
Texas diamondback terrapin	*Malaclemys terrapin littoralis*	SOC	
Gulf salt marsh snake	*Nerodia clarkii*	SOC	
Texas horned lizard	*Phrynosoma cornutum*	SOC	T
Mammal			
Maritime Texas pocket gopher	*Geomys personatus maritimus*	SOC	
Gulf Coast jaguarundi	*Herpailurus yagouaroundi cacomitli*	E	E
Southern yellow bat	*Lasiurus ega*		T
Ocelot	*Leopardus pardalis*	E	E
Atlantic Spotted Dolphin	*Stenella frontalis*		T
Rough-toothed Dolphin	*Steno bredanensis*		T
West Indian manatee (=Florida)	*Trichechus manatus*	E	E
Insect			
Maculated manfreda skipper	*Stallingsia maculosus*	SOC	
Bird			
Texas Botteri's sparrow	*Aimophila botterii texana*	SOC	T
Texas olive sparrow	*Arremonops rufivirgatus rufivirgatus*	SOC	
Aransas short-tailed shrew	*Blarina hylophaga plumbea*	SOC	
Mathis spiderling	*Boerhavia mathisiana*	SOC	
White-tailed hawk	*Buteo albicaudatus*		T
Zone-tailed hawk	*Buteo albonotatus*		T
Northern gray hawk	*Buteo nitidus maximus*	SOC	
Ferruginous hawk	*Buteo regalis*	SOC	
Northern Beardless-Tyrannulet	*Camptostoma imberbe*		T
Piping plover †	*Charadrius melodus*	T w/CH	T
Mountain plover	*Charadrius montanus*		
Black tern	*Chlidonias niger*	SOC	
Cerulean warbler	*Dendroica cerulea*	SOC	
Reddish egret	*Egretta rufescens*	SOC	T

Common Name	Scientific Name	USFWS	TPWD
American swallow-tailed kite	*Elanoides forficatus*		T
Northern aplomado falcon	*Falco femoralis septentrionalis*		E
American peregrine falcon	*Falco peregrinus anatum*		E
Arctic peregrine falcon	*Falco peregrinus tundrius*		T
Whooping crane †	*Grus americana*	E w/CH	E
Bald eagle †	*Haliaeetus leucocephalus*	T	E
Sennet's hooded oriole	*Icterus cucullatus sennetti*	SOC	
Audubon's oriole	*Icterus graduacauda audubonii*	SOC	
Loggerhead shrike †	*Lanius ludovicianus*	SOC	
Black rail	*Laterallus jamaicensis*	SOC	
Wood stork	*Mycteria americana*		T
Eskimo curlew	*Numenius borealis*		E
Rose-throated becard	*Pachyramphus aglaiae*		T
Brown pelican	*Pelecanus occidentalis*	E	E
White-faced ibis †	*Plegadis chihi*	SOC	T
Least tern †	*Sterna antillarum*	E	E
Sooty tern	*Sterna fuscata*		T
Attwater's greater prairie-chicken	*Tympanuchus cupido attwateri*	E	E

1 US Fish and Wildlife Service: E- Endangered; T- Threatened; SOC- Species of concern; CH- Critical habitat; CH‡- Critical habitat proposed; † - Migratory; TSA- Threatened due to similarity of appearance. Because similarity of appearance of the Texas American alligator hides and parts are protected crocodilians, it is necessary to restrict commercial activities involving alligator specimens taken in Texas to ensure the conservation of the alligator populations, as well as other crocodilians that are threatened or endangered. (Personal communication with Mary Orms, USFWS Corpus Christi Ecological Services Field Office, updated April 7, 2004)

2 Texas Parks and Wildlife Department: E- endangered; T- threatened (Campbell 2003, and TPWD website).

One of the most well known endangered species that inhabits the Mission-Aransas NERR is the whooping crane. This species winters along the south Texas coast at the ANWR (Figure 28). Historically the winter range of the whooping crane extended from Mexico up to Louisiana. Extremely low populations of this species were first noticed in the late 1930's. The ANWR was established in 1937 and the whooping crane is making a comeback from a low of 15 birds in 1941 to individuals 185 in 2003 (Tom Stehn, personnel communication).

Figure 28. Whooping cranes on an isolated island in ANWR.

The brown pelican is also a well known endangered bird species that is present within the proposed site. Brown pelican populations began declining in the 1930's and numbers dropped dramatically between 1952 and 1957 (Tunnell et al. 1996). Less than 100 individuals were believed to be present on the Texas coast from 1967 to 1974 (King et al. 1977). The drastic decline in numbers were due to hurricanes, disease and pesticides. Populations have been increasing since the 1970's and the increase is correlated with the discontinued use of DDT in 1972, along with conservation efforts. The primary nesting sites for brown pelicans are located on the outskirts of the proposed site at Sundown Island in Galveston Bay and at Pelican Island in Corpus Christi Bay (Tunnell et al. 1996)

4.9 Historical, Cultural and Archeological Resources

Karankawa, Tamaulipecan, and Coahuiltecan Indians are the first known inhabitants of the proposed site (Martin 1972, Hester 1980) (Table 11). It is estimated that they lived here for at least 20,000 years and disappeared by the mid-1800's. The Karankawan tribe and those within their linguistic family had the highest population within the proposed site with their range extending from Matagorda to Corpus Christi Bay (Hester 1980). There are several locations of archaeological sites from these tribes surrounding and within the proposed boundary (Hester 1980, Ricklis 1996) (Figure 29, Table 12). Analysis of these sites determined that tribes inhabited the large shoreline fishing camps from March to August and then moved inland to the smaller prairie-riverine hunting camps from September to March. Estuarine fauna, such as *Rangia* clams and fish, made up the bulk the diet at the shoreline camps, and large game, such as deer, made up the bulk of the diet at the inland camps (Ricklis 1996). Analysis of these archaeological sites have also determined that there have been three major periods of prehistoric fishery use: 1) about 7,500-7,000 YBP shellfish harvest, 2) Mid-Holocene about 5,900-4,200 YBP shellfish harvest and limited finfish harvest, and 3) Late Holocene after about 3,000 YBP heavy shellfish and finfish harvest (Ricklis 1993). The Corpus Christi Bay area was first discovered by Europeans in 1519, due to the efforts of Spanish Explorer Alonzo de Pineda (CCBNEP 1996). The decline of indigenous populations correlates with arrival of Spanish settlers when the first trading posts were established during the 1700's. Development and industrialism continued in the region resulting in the present day society.

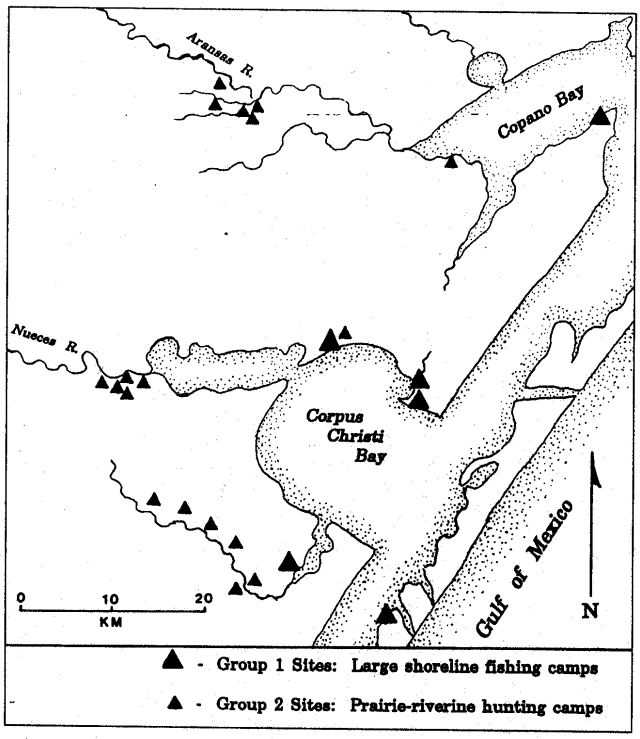

Figure 29. Locations of known large shoreline fishing camps (Group 1 sites) and smaller prairie-riverine camps (Group 2 sites) in Corpus Christi and Copano Bay. From *"The Karankawa Indians of Texas: an Ecological Study of Cultural Tradition and Change"* by Robert A. Ricklis, Copyright 1996. Courtesy of the University of Texas Press.

Sites of historical interest are also present in the proposed site. The Aransas Pass Lighthouse was established as a lighthouse in 1855, and is listed in the National Historical Registry. The lighthouse is located in the Lydia Ann Channel. It was seriously damaged during a Confederate attack in December 1862, in which the top twenty feet of the tower was destroyed. It was rebuilt in 1867 and was decommissioned in 1952 (Holland 1972). The current private owner had the light re-commissioned in 1988. The banks of the Cedar Bayou inlet also have remains of 19th century brickyards. At this site, large complexes of brick kilns, huge open cisterns, and associated brick foundations are present to account for relics of the industrial age (Fox 1983).

Table 11. Indian tribes of the South Texas coast.

Linguistic Family	Tribe	Range
Karankawan	Copane	Mission River, San Jose Island
Karankawan	Coapite	Goliad; San Antonio River
Karankawan	Coco	Nueces River to Brazos River
Karankawan	Cujan	Aransas and Copano Bays; San Jose Islands
Tamaulipecan	Malaguite	Nueces to Baffin Bay
Tamaulipecan	Araname	San Antonio River
Tamaulipecan	Lipan	Nueces to Baffin Bay
Coahuiltecan	Pajalache	San Antonio River, Gulf coast
Coahuiltecan	Piguique	Nueces River and coast
Coahuiltecan	Atanaguaypacam	Gulf Coast Bays
Coahuiltecan	Cacaxtle	South bend of Nueces River
Coahuiltecan	Chayopin	East of Nueces River, near coast
Coahuiltecan	Pajaseque	Near Corpus Christi Bay
Coahuiltecan	Pamoque	Mouth of Nueces River; Nueces and Corpus Christi Bays
Coahuiltecan	Papanac	Nueces River
Coahuiltecan	Pastaloca	Nueces River valley

Table 12. Archaeological sites presently known in the proposed Mission-Aransas NERR.

Site	Location	Site Type	Camp Type	Items Found
41CL3	Mustang Lake (ANWR)	Midden	Large shoreline fishing and hunting camp	Shells, fish bones, pot shards, animal bones, perforated oysters, shell tools, chert flakes
41CL84	North of Mustang Lake (ANWR)	Midden	Prairie-riverine hunting camp	Shells, fish bones, pot shards, animal bones, perforated oysters, shell tools, chert flakes
41CL48	South of Mustang Lake (ANWR)	Midden	Prairie-riverine hunting camp	Shells, fish bones, pot shards, animal bones, perforated oysters, shell tools, chert flakes
41SP159	Aransas River Mouth	Midden	Large shoreline fishing camps	Arrow points, small unifacial end scrappers, prismatic blades, pottery, Rangia clams, fish and animal bones
41SP160 thru 41SP171	Moody Creek (Aransas R.) flood plain	Midden	Prairie-riverine hunting camps	Cultural debris, Rangia clams, fish and animal bones

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 General Impacts

The overall impact of designating the Mission-Aransas NERR and implementing the MP in the years to come will be environmentally beneficial and result in positive social, economic, and ecosystem impacts. From a national perspective, this will result in the establishment of the 27th NERR providing a more complete network of estuarine systems that represent the biodiversity found in the U.S. and its territories. Estuaries are heavily used for many purposes and subject to continuous degradation. The ability to focus research and increase an appreciation for the role and health of estuaries will help to achieve the national goals set forth in the CZMA, namely, to provide a stable environment for research and enhance public awareness and understanding of estuarine areas. Federal funds along with matching funds provided to the UTMSI will support increased and more coordinated efforts with its partners towards this end.

Impacts of the education and research programs will be positive (Figure 30). Pre-existing uses won't conflict with long-term research and education within the proposed reserve. Designation of the Mission-Aransas NERR will provide the opportunity to obtain better scientific information on which to accomplish a more comprehensive, integrated approach to the management of the Texas coastal ecosystems. Data and other information resulting from these programs will provide reserve managers, regulatory agencies and local and regional policy-makers with the necessary tools to make informed decisions that ensure the wise use and management of natural and estuarine resources. In this sense, designation could eventually lead to other resource management agencies modifying their regulatory practices and requirements because of research results, for example, the impact of certain activities at certain times of the year on water quality. This has been demonstrated in the past in the case where dredging operations associated with maintenance of the GIWW within the Aransas National Wildlife Refuge is held in abeyance during the presence of the whopping crane to ensure there is no disturbance to their winter habitat.

Figure 30. UTMSI researcher in view of the historic Aransas Pass Lighthouse.

Designation and MP implementation do not require prohibition on the traditional uses of the area (Attachment A, Appendix 2). Hunting, fishing, and oil and gas exploration and production will continue to be administered by the appropriate regulatory resource agencies. Important transportation corridors such as the GIWW along with the necessary dredge disposal sites, and the Copano Bridge corridor have been excluded from the boundaries of the Reserve. These corridors bisect the NERR site and will continue to be heavily used and modified/disturbed through maintenance activities. Designated core research areas are sufficiently protected to ensure a stable environment for research. Access to the area for recreation and education will be enhanced through the proposed visitor, welcome centers, and nature trails. (Attachment A, Section 6.0).

Construction of future facilities required to support NERR objectives for research and education will be relatively minimal. Anticipated construction of several support facilities will be on shore or within the reserve buffer areas and will result in minimal environmental disturbance as necessary. There will be little or no physical alteration of the present environmental conditions in the reserve except for those activities described in the Research and Monitoring Plan (Attachment A, Section 8.0). Any future projects after designation that may include construction will be reviewed and assessed for potential impacts according to NEPA procedures and within the context and scope of this programmatic environmental impact statement.

Establishment of the Reserve Advisory Board (RAB) upon NERR designation will help provide a mechanism to mitigate conflicts between uses within the reserve and guide the implementation of reserve programs. Resolution will be sought

through research, and discussion of the RAB members. All decisions by the RAB must be consistent with the NERRS MP and policies and with existing state and Federal regulations.

5.2 Specific Impacts

5.2.1 Natural Environment

Figure 31. Diagram of proposed additions to Wetland Education Center.

Physical impacts on the natural environment through the designation of the Mission-Aransas NERR will be minor, inc1uding those areas within the buffer where the facilities will be located. No extensive habitat manipulations are planned based on designation of the NERR and limitations to the conduct of such activities apply (Attachment A, Appendix 1, Sec. 921.1.(d) Habitat Manipulation). Buildings and other facilities will be designed and constructed with minimal visual or environmental impact and as the MP suggests, as "green" as possible. UTMSI has been in the process for more than four years to expand their campus to include a Wetlands Education Center (WEC) (Figure 31). The expansion includes the restoration of a fishery and waterfowl (aquatic and wetland) habitat adjacent to their existing research and laboratory facilities. Appropriate permits and environmental assessment studies (Environmental Assessment and Finding of No Significant Impact, August 2003) have been undertaken by the U.S. Army Corps of Engineers, Galveston District, under Section 206 Ecosystem Restoration Project authority (Water Resources Development Act of 1996, as amended). The expansion also includes a 5 year license to use the 9+ acres east of the University's property line bounded on the south by Cotter street and on the north by the south jetty. These leased acres can be used for habitat creation, ie dunes, staging the WEC construction, and eventually for an additional parking lot to support the increase in visitors to the WEC. This projected change to the campus would occur with or without NERR designation consequently no further assessment is necessary at this time. Once completed, however, this change will be incorporated into the overall NERR site designation. The project will incorporate tidal flushing of the wetlands, boardwalks to enhance access, creation of a new dune system, and provide enhanced research capabilities. This man-made created environment represents a portion of the estuarine ecosystem complex and will add significantly to the scientific and educational capabilities of the WEC and undoubtedly to the enjoyment of all who visit the future facility.

Figure 32. Typical NERR data logger.

There will be temporary but minor impacts associated with the installation and use of instruments for research and data gathering. The National Estuarine Research Reserve System-wide Monitoring Program tracks short-term variability and long-term changes in estuarine waters to understand how human activities and natural events can change ecosystems. It provides valuable long-term data on water quality and weather at frequent time intervals. Usually, four automated data loggers are strategically placed in each NERR site (Figure 32). Coastal managers use this monitoring data to make informed decisions on local and regional issues, such as "no-discharge" zones for boats and measuring the success of restoration projects. The reserve system currently measures physical and chemical water quality indicators, nutrients and the impacts of weather on estuaries. Reserve research policies indicate that: "all field work will be performed in the least destructive way with minimal or no impact on the environment, and when a destructive impact of significant size to the environment is unavoidable, restoration of the impact is required (Attachment A, Section 8.0).

The University of Texas at Austin Marine Science Institute, the lead state agency for the Reserve, will hold the conservation easement for Fennessey Ranch. The easement will protect native plants, animals, or plant communities on Fennessey Ranch and prevent any use that will significantly impair or interfere with the conservation values and assure

that traditional uses are compatible with the conservation values of Fennessey Ranch. The conservation easement will ensure that future water manipulation or restoration projects, such as the Fennessey Ranch Mitigation Bank Proposal, be reviewed and approved on a project basis by Reserve staff. Other management practices on Fennessey Ranch, such as grazing and brush control, will be subject for review by Reserve staff through a five year revision of the Fennessey Ranch management plan. Consequently, at this time no additional assessment is made of specific impacts that might be generated for projects that are not approved at this time in the MP.

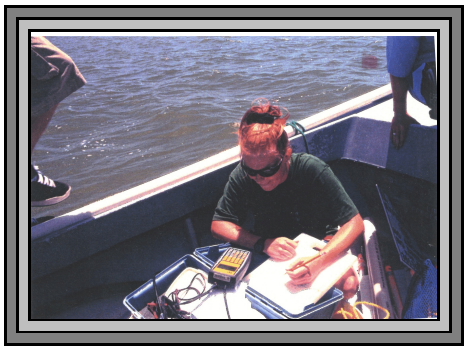

Figure 33. Scientific observation and data entry.

As a result of reserve designation, research programs will be better coordinated. Better coordination of research programs will promote a multi-disciplinary understanding of estuaries in general and, specifically, the Mission-Aransas Estuary (Figure 33). This will also assist in a greater understanding of the life cycles of commercially important species within the ecosystem, natural or anthropogenic changes to the system, and provide more comprehensive information potentially leading to better management decisions by responsible resource and regulatory agencies.

Organized educational opportunities and efforts will also be created upon reserve designation. Expansion of the current programs and newly developed programs will encourage local school and citizen participation from South Texas, which leads to a greater understanding and appreciation of estuarine systems. Increased awareness often fosters a sense of stewardship toward the natural environment and a desire to protect and preserve the flora and fauna within the ecosystem.

5.2.2 Human Environment

The research and educational activities outlined in the MP will help address current management issues through a better understanding of estuarine processes. Designation of this Reserve will provide an opportunity for long-term scientific observations. Future studies can begin to address the spatia1 and temporal scales essential to support informed management practices and decisions. The site's boundaries encompass a large portion of an intact coastal watershed that includes both estuarine and adjacent non-estuarine areas. As such, the site's size will ensure an adequate level of conservation and management.

Developing educational and interpretive activities that bring scientific research into the public sector will be a strong component of this reserve. As our society becomes more aware of the need to protect the environment, it is important to involve teachers and students in the process of scientific research (adjacent Text Box). The Reserve will serve as an outdoor classroom for direct experiences with science. Currently, there exist a variety of marine science education programs at the UTMSI that target selected adult groups such as K-12, teachers, and the retired general public. Additional programs designed for local decision makers will also logically benefit from the site. Increased public awareness also may have a positive economic benefit for the region leading to new opportunities for ecotourism and other activities compatible with reserve goals. It is not unusual for NERR sites to see a 10 fold increase in student and visitor visitations to NERR facilities. As the MP points out, approximately 67,000 students were involved in NERRS education programs in 2002 and nearly 2,000 K-12 educators were involved in professional development programs offered at NERR sites (Attachment A, Section 9.0).

Alabama High School Sea Grass Restoration Day at the Weeks Bay National Estuarine Research Reserve

On Tuesday, April 19, 2005, thirty-five Gulf Shores High School students teamed up with staff from the Weeks Bay National Estuarine Research Reserve to restore underwater grass beds near Fairhope, Alabama. The students planted *Vallisneria americana*, or tape grass, one of five common species of submerged aquatic vegetation (SAV) in Weeks Bay. The planting project is a culmination of several local efforts to restore native underwater grasses from the damaging impacts of coastal runoff containing high levels of nutrients and toxic pollutants, boat propellers, and dredging. Submerged grasses are a critical food source and protective habitat in coastal waters. The leaves and roots provide excellent food sources for aquatic birds, fish, and invertebrates, and sea grass beds provide refuge from predators and wave action.

Recent example of students working with Alabama NERR staff in an educational restoration project. (NOAA)

Designation of this reserve will also increase collaborations among Texas universities and colleges. Designation will create a focal point for estuarine studies and increase the amount of funding opportunities for researchers from Texas universities and colleges. The availability of two national fellowships, local fellowships, and travel assistance to Texas scientists will further help develop strong partnerships among Texas universities and colleges.

5.2.2.1 State and Federal

Although many state and Federal resource protection programs and regulatory requirements exist, improved measures at coordination between the different responsible agencies and/or the programs designed to protect and manage the resources is often a goal. Establishment of the Mission-Aransas NERR will facilitate bringing these programs together through the Reserve Advisory Board and advisory committees to consider comprehensive management needs of the estuary, its resources and resource users without the need for establishing new regulations or programs. The ability to identify research priorities and coordinate research work among the various partners is a potential benefit of program approval. NERRS provides opportunities for greater collaboration in research, education and outreach between agency programs. As pointed out in the draft Memorandum of Understanding (MOU) between the UTMSI and the cooperating parties-in-interest, nothing in the MOU diminishes their independent authority, respective statutory or legal obligations. However, their purpose of participating in the program is to "assist Reserve land managing entities to develop site-specific activities consistent with the MP" including "identifying and conserving sensitive ecological resources, promoting on-site research and long term monitoring, engaging local communities in stewardship activities that support the conservation of sensitive reserve resources" (Attachment A, Appendix 4).

5.2.2.2 Socioeconomic Impacts

The Texas area is largely rural; the designation of the Mission-Aransas NERR will have little direct impact on the communities within the site (Table 13). The majority of the land surrounding the proposed site is used for agriculture and rangeland for cattle. Land use around the Mission-Aransas Estuary is divided into six categories: developed lands, cultivated lands, grasslands, woodlands, shrublands, and bare lands.

Table 13. Estimated population density in counties surrounding the Mission-Aransas Estuary. Data generated from the U.S. Census Bureau, http://www.census.gov/. Area and persons per square mile are calculated based on census data from the year 2000.

County	2003 Population Estimate	Area, Square Miles	Persons per Square Mile
Aransas	23,574	252	89.3
Calhoun	20,454	512	40.3
Refugio	7,625	770	10.2
San Patricio	68,050	692	97.1
Nueces	315,206	836	375.3
State of Texas	22,118,509	261,797	79.6

San Patricio County, which encompasses a very small portion of the site including Buccaneer Cove Preserve and the southern tip of Port Bay, has the highest percentage of cultivated lands followed by Refugio and Aransas County, respectively. The Aransas River watershed includes Chiltipin Creek and other unnamed tributaries which drain approximately two-thirds of San Patricio County including the cities of Sinton, Odem, and Taft. This drainage includes more than 250,000 acres of intensely managed cotton and grain sorghum row crop farms. Much of the Aransas River watershed lies within the land holdings of the Welder Wildlife Foundation (7,800 acres), whose primary purpose is wildlife management and conservation. In contrast, Aransas County has the highest percentage of both bare lands and developed lands. Most bare lands in this area are delineated as bay shoreline beaches, creating a significant tourism focus in the county and extensive urban development. Refugio has the most rural land use of the three counties, with the majority of the land identified as agriculture or ranching: limited urban development is centered around the towns of Refugio, Woodsboro, Bayside, Tivoli, and Austwell. The city of Corpus Christi with a population of over 250,000 is the largest city in the area and as a result, the Nueces Estuary generally has more anthropogenic activities than the

Mission-Aransas or Baffin Bay-Laguna Madre Estuary (Montagna et al. 1998). The Port of Corpus Christi is the sixth largest port in the United States, making marine transportation a dominant industry in the area. The Port of Corpus Christi houses several facilities including: liquid bulk docks, cargo terminals, Rincon Industrial Park, Ortiz Center, and a cold storage terminal. All ship traffic enters through the Aransas Pass, which lies just south of the proposed site.

Designation of the reserve will not result in new regulations and no adverse economic impact will occur to existing uses. The primary existing uses within the proposed reserve include oil and gas activities, recreational and commercial fishing, ground and surface water withdrawal, tourism, and shipping (Table 14).

Table 14. Annual economic estimates for the state of Texas of the primary uses within the proposed reserve.

Industry	Amount	Estimated Value	Year and Source
Commercial Finfish	6,317,800 lbs.	$8,023,500	1997, TPWD
Commercial Shellfish	71,811,800 lbs.	$181,142,300	1997, TPWD
GIWW shipping	63,390,000 short tons	$25,000,000,000	2002, TxDOT
Oil Production	390624005 bbl	$496,111,400 in tax	2004, RRC and Texas Comptroller
Gas Production	5952623117 mcf	$1,392,436,142 in tax	2004, RRC and Texas Comptroller

Estuaries along the Gulf of Mexico, including Texas, are rich in oil and gas deposits. Every estuary in the Western Gulf of Mexico Biogeographic Sub-region has oil and gas wells and pipelines. Much of the past production in the Mission-Aransas Estuary has been depleted. However, recent testing indicates that there is interest in deeper exploration and drilling in the area. As drilling technology continues to improves, deeper and deeper depths become prospective. Currently, the Mission-Aransas Estuary has a low number of current leases and little production in comparison to all other estuaries along the Texas coast. The Mission-Aransas Estuary has the second lowest number of leases, and Aransas county has the second lowest production rates in comparison to all Texas coastal counties.

Recreational and commercial landings of finfish, shrimp, and shellfish appear to be on an upward trend in the Mission-Aransas Estuary. Abundance of finfish, shrimp, and blue crab harvests were nearly equal to each other from 1972 - 1976. After 1976, the percentage of finfish harvests began to decrease in relation to shrimp and blue crab harvests. After 1981, and up to the present time, shrimp harvests increased in relation to finfish and blue crab harvests, and are now the major fishery for the Mission/Aransas estuary (Robinson et al. 1994).

There are several small watersheds in the Reserve. Most of these watersheds drain into Copano Bay, but one drains into Port Bay and one drains into St. Charles Bay. The Mission and Aransas Rivers are small and primarily coastal compared to other rivers in Texas. About 40% of all the water used in Texas is supplied by surface water structures. The cities and towns in the region of the Mission-Aransas Estuary are largely served by the City of Corpus Christi and ground water (well-water) systems. The City of Corpus Christi operates two dams on the Nueces River, and is the major water wholesaler to municipal and county water resellers. Neither the Mission River nor the Aransas River has dams, or is used as water supplies for cities in the region. Groundwater supplies 60% of the water used in Texas, but 81% of that use is for irrigation. The watersheds lie above the vast Gulf Coast Aquifer, which stretches the length of the entire coastal plain of Texas. The Gulf Coast Aquifer represents 15% of the groundwater in Texas and is the second largest aquifer after the Ogallala. Groundwater conservation districts are just in the beginning phases of operation in this region.

The proposed reserve has a large tourism economy due to accessible beaches, abundant recreational fishing opportunities, and a high diversity of bird species. Designation of the reserve may increase tourism to the urban centers of Corpus Christi, Refugio, and Rockport from the presence of the planned NERR facilities.

The Gulf Intracoastal Waterway (GIWW) is a major industrial water transportation canal that bisects Aransas Bay within the proposed site. The waterway is economically imperative to the Texas Coast because it facilitates transporting petrochemicals and agricultural as well as industrial products that would otherwise be too costly or impossible transport by road. The Copano Bay Causeway bisects the NERR between Aransas and Copano Bay. There are also numerous state roadways adjacent to the NERR boundary. These roadways include state highways, farm to market roads, and park roads. There will be no impact on GIWW or Corpus Christi Ship Channel commerce or the use of dredge spoil islands with

designation of the Reserve. At the request of the USACOE and the TxDOT, major transportation corridors (GIWW, Lydia Ann Channel, and Channels to Rockport and Little Bay) were excluded from the boundary. The ship channel and the majority of dredge spoil islands (600 yards west of the intracoastal) are outside of the proposed boundary. In addition, traditional uses including the disposal of dredge material will continue because they are outside the NERR boundary. Thus, the proposed reserve is adjacent to (but does not include) the GIWW, and no adverse economic or marine navigational impacts will occur.

5.2.2.2.1 Tax Revenue Impacts

No change in the tax status of the lands comprising the Reserve will result from designation of the site as a NERR. Hence, no taxes will be lost. Any future acquisitions of private in holdings within the reserve would result in minimal loss of tax revenue. The use of conservation easements to protect areas from future development, could result in some foregone economic opportunities should land be valued for development purposes.

5.2.2.2.2 Traffic and Institutional Impacts

It is anticipated that there will be a slight increase in traffic with the establishment of the Mission-Aransas NERR. The increase, however, should not be significant and adverse impacts to the site would be minimal. Reserve visitor traffic will be directed to the UTMSI visitor center. This could result in additional traffic going through the streets of Port Aransas to the WEC. The location will serve as the main contact point for visitors to receive introductory information about the reserve. Reserve staff will coordinate with other educational groups to minimize traffic impacts. Other sites (ANWR, Fennessey Ranch, the Aransas Bay Multi-purpose Public Outreach Facility in Rockport, etc) are all likely to see an increase in visitors in the years to come leading to some increase in traffic but not likely to cause congestion problems for local residents.

Apart from increased traffic to and from the NERR facilities, few adverse impacts are expected. The development of on-site educational and research programs will, however, have a potentially large impact on the local and regional school systems and research communities. Research facilities throughout the state of Texas will also benefit from the site. Although exact estimates of the economic benefits to the area are not available, it is not expected to be large due to the rural character of the area and the increased draw of tourism.

5.2.2.3 US Army Corps of Engineer Permits

Reserve designation can potentially impact on a few proposed future activities if they require Federal permits including those issued by the USACOE in wetlands and waterways.

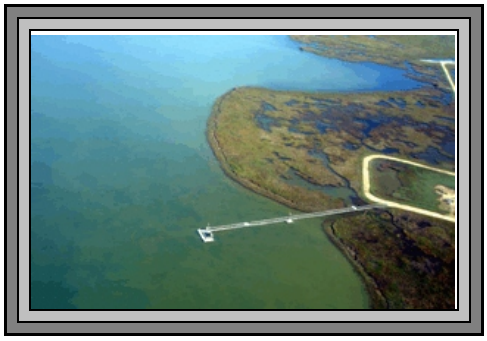

Figure 34. Oil and gas related facilities in estuary.

There are three permits that one can use to carry out construction-like activities: nationwide permit (NWP), general permit, or individual permit. NWPs are pre-approved permits for activities that have already been approved by state and Federal levels. Designation of a NERR will affect some NWPs, because under General Condition 25, a NERR site is defined as a “designated critical resource water”. Designation of a NERR will not affect general or individual permits. General permits are pre-approved permits for specific activities that have already been approved at the state level. Some of these include permits for piers 14392(05), and spur jetties 17466(02), 14533(04) (http://www.swg.usace.army.mil/reg/permitgp/general.asp). Individual permits are required for activities that exceed the thresholds of NWP or for those that the district engineer identifies after preconstruction notification process. The individual permit requires that a public notice be sent to organizations, such as TCEQ, who can comment on the permit within 30 days of the notice. Once the NERR is designated, a representative from the NERR will likely be on this mailing/notification list (Lloyd Mullins, personal communication).

Designation of a NERR will mean that some NWP activities will require a preconstruction notification (PCN) to the district engineer (Federal Register / Vol. 67, No. 10 / January 15, 2002 / Notices, http://www.usace.army.mil/inet/functions/cw/cecwo/reg/2002nwps.pdf). A PCN requires that the permittee submit

notification to the District Engineer before construction. Submittal of the PCN may include several requirements, such as delineation of affected aquatic sites. The District Engineer has 30 days to ask for additional requirements and can only do so once. If the permittee does not receive written notice from the District Engineer within 45 days then the permittee can proceed with the activity. After the PCN requirements are approved by the district engineer, there is a 45-day waiting period for comments. During the 45-day waiting period, Federal and State agencies can submit comments to the district engineer concerning compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level. If the activity will result in a loss of greater than 1/2-acre of water, the District Engineer will personally notify appropriate agencies (USFWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO), and, if appropriate, the NMFS). When this occurs, these agencies have 10 days to indicate that they intend to provide substantive, site-specific comments. If contacted by an agency, the District Engineer will wait an additional 15 calendar days before making a decision on the notification. A decision by the District Engineer may include modification of the activity or mitigation. The following activities are those that will require a PCN with the designation of a NERR:

NWP 3 - Maintenance
NWP 8 - Oil and Gas Structures
NWP 10 - Mooring Buoys
NWP 13 - Bank Stabilization
NWP 15 - U.S. Coast Guard Approved Bridges
NWP 18 - Minor Discharges
NWP 19 - Minor Dredging
NWP 22 - Removal of Vessels
NWP 23 - Approved Categorical Exclusions
NWP 25 - Structural Discharges
NWP 27 - Stream and Wetland Restoration Activities
NWP 28 - Modifications of Existing Marinas
NWP 30 - Moist Soil Management for Wildlife
NWP 33 - Temporary Construction, Access and Dewatering
NWP 34 - Cranberry Production Activities
NWP 36 - Boat Ramps
NWP 37 - Emergency Watershed Protection and Rehabilitation
NWP 38 - Cleanup of Hazardous and Toxic Waste
NWP 41 - Reshaping Existing Drainage Ditches

Some of these activities (NWP 3, 13, 18, 27, 33, 34, 37, 38, 41) under certain conditions require a PCN regardless of NERR designation. Most of the activities listed above (NWP 3, 10, 13, 15, 19, 28, 34, 36, 38, and 41) will occur in areas excluded from the NERR boundary, so no change will be required. However two activities may occur within the boundary (NWP 8 and 22), and a PCN for these activities would be required with NERR designation.

Designation of a NERR site will also mean that discharges of dredged or fill material will not be authorized by some NWPs (Federal Register / Vol. 67, No. 10 / January 15, 2002 / Notices, http://www.usace.army.mil/inet/functions/cw/cecwo/reg/2002nwps.pdf). Discharges from the following activities will not be allowed within the NERR boundary:

NWP 7 Outfall structures and maintenance
NWP 12 - Utility line activities
NWP 14 - Linear transportation Projects
NWP 16 - Return Water From Upland Contained Disposal Areas
NWP 17 - Hydropower Projects
NWP 21 - Surface Coal Mining Activities
NWP 29 - Single-family Housing
NWP 31 - Maintenance of Existing Flood Control Facilities
NWP 35 - Maintenance Dredging of Existing Basins
NWP 39 - Residential, Commercial, and Institutional Developments
NWP 40 - Agricultural Activities
NWP 42 - Recreational Facilities
NWP 43 - Stormwater Management Facilities
NWP 44 - Mining Activities

UTMSI is not aware that any of these activities have ever occurred within the proposed boundary of the NERR site. Many of these activities can not occur on water. The other activities would occur only along shorelines, which are already excluded from the NERR site. Thus, the NERR designation will have no effect on NWPs.

5.2.3 Cumulative Impacts

As opposed to many EIS project analyses, the preferred alternative in this document does not propose any action that would significantly disrupt the landscape. There will be no change in land ownership, and current uses of the bay will continue under present regulatory authorities. Reserve designation is largely an administrative action.

The new reserve will increase attention to research and education uses of the site. There are already several research and educational programs in the area. On field outings, large numbers of visitors could have detrimental effects on fragile habitats. Rather than adding to the impacts of these groups, the reserve will seek to reduce the cumulative impacts by promoting guide/teacher training and coordinating access.

A major focus of the proposed Texas NERR research program will be to monitor biological and physical variables of the bay. These variables will provide the long-term baseline data against which the reserve may assess environmental changes over time, be they anthropomorphic or natural trends in the ecosystem. Enhancing our understanding of the spatial and temporal processes in the system will support informed management practices and improve stewardship of coastal natural resources in the future. These cumulative impacts from reserve designation are beneficial.

Regionally, the NERR designation will make UTMSI a center for estuarine research and education in South Texas. Thus, the reserve will serve resource users, coastal decision-makers, educators and visitors throughout South Texas.

Nationally, the cumulative impact of the Mission-Aransas NERR designation is to further NOAA's mission of establishing a complete system of reserves in all biogeographic subregions and estuarine types in the United States.

5.3 Unavoidable Adverse Environmental or Socioeconomic Impacts

Because of the nature of this Federal action, it is anticipated that adverse environmental or socioeconomic impacts will be minimal, nonexistent or avoidable. Future construction of NERR facilities should minimally impact surrounding environments. The reserve MP does not attempt to change existing local, state or Federal laws/regulations relating to current and traditional uses. There will be continued growth and development surround the Reserve and possibly in the Reserve such as future oil and gas exploration and development activities but these are unrelated to the Reserve and MP. The MP is designed to encourage good stewardship and better understanding of the estuarine resources. Currently, there will be no change in land ownership or of tax revenue with the designation of the Mission-Aransas NERR. Future donations or acquisitions could result in a change in land use (e.g., donated wetlands or agriculture lands change to conservancy or preservation use) but these changes would not be considered adverse. The plan can only be rewritten or the boundaries changed with a complete public review process using NOAA guidelines.

5.4 Relationship between the Proposed Action on the Environment and the Maintenance and Enhancement of Long-term Productivity

The stated purpose of the NERR program is to guarantee the long-term stability of the natural resources for research and education. All traditional uses of the area will continue under present regulations. There will be no exploitative use of the natural resources at the expense of long-term productivity or continued public use; nor will there be any recognizable negative consequences on the natural resources from establishment of the reserve. In fact, by providing education and support for applied research, establishment of the reserve has the potential to foster ecosystem productivity through improved resource stewardship and informed decision making. Designation of the reserve also empowers the reserve staff to research, maintain and potentially improve the ecosystem's productivity.

5.5 Irreversible and Irretrievable Commitment of Resources

The designation of the Mission-Aransas NERR and implementation of the MP should not result in any irreversible or irretrievable commitment of environmental resources. No environmental change is anticipated or permitted through the program (other than minor disturbances associated with research). The Mission-Aransas NERR will be operated and

managed with advice of the land holding partners. Each of these partners has a vested interest in the NERR in the form of land ownership, or in terms of conserving natural resources. This partnership is voluntary. Any partner could, if they choose, withdraw from the partnership. However, MOU's specifying the relationships between the partners and each partner's commitment to the reserve have been developed and are available to review in the MP. It is not anticipated that this arrangement will result in a withdrawal of resources. No significant construction is anticipated except for those structures outlined in the facilities plan. Sport and commercial fishing, shellfish and game harvesting, oil and gas operations, and other traditional uses will continue under current regulatory authorities, but are not activities associated with the NERR implementation or management. It is one of the goals of the program through better understanding of the estuarine ecosystem to ensure appropriate agencies, decision makers and the public have better science to help ensure irreversible or irretrievable commitment of resources does not occur.

5.6 Possible Conflicts Between the Proposed Action and the Objectives of Federal, State, Regional, Local, and Native Land Use Plans, Policies and Controls for the Areas Concerned

It is not anticipated that establishment of the Reserve will conflict with the objectives of Federal, state, regional or local land use plans, policies or controls for the areas concerned. The MP described the activities that take place in and around the Reserve and the authorities that govern those uses (Attachment A, Appendix 2). The majority of land comprising the Mission-Aransas NERR is currently under Federal and state ownership with small, private in holdings. Staff will coordinate with these and adjacent private landholders on an as needed basis to address any issues that may arise after the Reserve is designated. Any advice or action will be consistent with NERRS, local, state or Federal regulations or policies. The Reserve will schedule meetings as necessary with the various landholders to share ideas, promote efficiency, and resolve conflicts. Core research sites are protected through the GLO leases where parcels that have been designated as seagrasses, coastal wetlands, tidal flats are identified and included as Coastal Natural Resource Areas (CNRAs) where future activities must avoid, minimize, restore, enhance, protect or mitigate for impacts. Consequently, reference core sites should not be subject to competing requests such as from oil and gas activities.

5.6.1 The Texas Wetlands Conservation Plan

The Texas Wetlands Conservation Plan was initiated in 1994 to focus on nonregulatory, voluntary approaches to conserving Texas' wetlands. Although development of the Texas Wetlands Conservation Plan ("the Plan") was coordinated by Texas Parks and Wildlife Department, the Plan is intended as a guide for wetlands conservation efforts throughout the state. The Plan focuses on:

- Enhancing the landowner's ability to use existing incentive programs and other land use options through outreach and technical assistance;
- Developing and encouraging land management options that provide an economic incentive for conserving existing wetlands or restoring former ones; and,
- Coordinating regional wetlands conservation efforts.

This conservation plan will be used when designing programs that affect the wetlands in the Mission-Aransas NERR such as on the Fennessey Ranch. Further information on the Texas Wetlands Conservation Plan for Texas can be found on the TPWD website (http://www.tpwd.state.tx.us).

5.6.2 The Coastal Bend Bays Plan

The Coastal Bend Bays Plan was developed in 1998 by the Corpus Christi Bay National Estuary Program (CBBEP 1998a). This plan is a long-term, comprehensive management tool designed to complement and coordinate existing resource management programs and plans. Fifty specific actions were developed in the plan to address human uses, maritime commerce and dredging, habitat and living resources, water and sediment quality, public education and outreach, and freshwater resources. The plan coordinates resource management of the Coastal Bend Estuaries, which include (Mission-Aransas, Nueces, and the Upper Laguna Madre). This bays plan will be used by the proposed Reserve when designing programs that affect the Mission-Aransas Estuary.

5.6.3 The Mission-Aransas Watershed Wetland Conservation Plan

The Wetlands Conservation Plan was developed in 1999 to:

1) Provide voluntary alternatives for local government and public use;

2) Facilitate the meeting of local government with natural resource agency personnel, academic staff, and non profit organizations, and

3) Develop goals, objectives, and alternatives to serve as tools for local government, and economic/ecologic planning (Smith and Dilworth 1999).

This conservation plan will be used by the proposed reserve when designing programs that affect the Mission-Aransas Watershed.

5.6.4 The Seagrass Conservation Plan

The Seagrass Conservation Plan for Texas was finished in 1998 by the lead agencies of TPWD, GLO, and TCEQ. This conservation plan prioritizes issues affecting the health and quality seagrasses and was used to identify and help implement strategies and actions to protect seagrasses. Some of those strategies and actions that were developed in the conservation plan include:

- Determine status and trends of seagrass beds on a regular basis
- Public education and outreach
- Coordination of the permit review process between GLO, TCEQ, USFWS, NMFS, and USACOE
- Establishment of coastal preserve areas to protect seagrass habitat
- Coordination of watershed management programs to protect seagrass habitat

This conservation plan will be used by the proposed reserve when designing programs that affect seagrass habitat. Further information on the Seagrass Conservation Plan for Texas can be found on the TPWD website (http://www.tpwd.state.tx.us/texaswater/coastal/seagrass/conservation.phtml).

5.7 Compliance with Other Environmental and Administrative Review Requirements

The approval of the Reserve and MP and award of future financial assistance are Federal actions subject to authorities such as the National Environmental Policy Act, Endangered Species Act, and the Federal consistency provisions of the CZMA. NOAA is responsible for ensuring that projects comply with these and other relevant authorities. Compliance with these authorities will result in few environmental, social, and economic negative impacts.

5.7.1 National Flood Insurance Program (NFIP) and Executive Order 11988, Floodplain Management

The NFIP prohibits the use of funds for acquisition or construction of buildings in special flood hazard areas in communities that are not participating in the Flood Insurance Program, as identified in the NFIP's Community Status Book. Any future construction of buildings or facilities that use NOAA funds will be subject to review and compliance with appropriate building standards should such structure be located in a flood hazard area. E.O. 11988 directs Federal agencies to evaluate the potential effects of proposed actions on floodplains. Many actions associated with the Reserve will occur in the waters or surround lands in floodplains in order to achieve their research, monitoring or educations objectives. However, these are considered to be temporary or minor and not contribute to increased future flood damages.

5.7.2 Coastal Barriers Resource Act (CoBRA)

In order to receive Federal funds, all proposed projects located on undeveloped coastal barrier islands designated in the CoBRA system must be consistent with the purposes of minimizing: the loss of human life; wasteful Federal expenditures; and damage to fish, wildlife, and other natural resources. No adverse impacts as a result of implementation of the MP or expended funds are anticipated to occur to undeveloped barrier islands. San Jose Island is privately owned and not included in the Reserve and portions of Matagorda Island are under the control of the U.S. Fish and Wildlife Service and not subject to future development. Some future studies under the NERRS program may result in studies to help determine the important role of undeveloped coastal barrier islands on interior

Figure 35. New boardwalk in ANWR allowing public to view wildlife.

estuarine ecosystems. Future NERR related projects may assist public access and viewing (Figure 35, example of construction) but will meet CoBRA requirements.

5.7.3 Endangered Species Act

NOAA/NOS believes that neither program implementation nor Federal funding of the activities of the proposed reserve will jeopardize the continued existence of a listed species under the Endangered Species Act (ESA) or result in the destruction or adverse modification of designated critical habitat. The purpose of the NERRS is to conduct research and monitoring and to develop solutions to problems affecting estuarine environments. Some future studies may focus on endangered or threatened species within the Reserve, but researchers are required to follow appropriate research protocols when conducting such studies. In some cases, a new boardwalk providing access to the public will encourage some encroachment into habitat by the public, but under controlled conditions. NOS has initiated ESA Section 7 consultation regarding the proposed NERR with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, and that process is ongoing.

5.7.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act requires that Federal agencies consult with NMFS regarding any action authorized, funded, or undertaken that may adversely affect essential fish habitat (EFH) for federally managed fish. The Reserve will have positive impacts on EFH by improving the science associated with better understanding the important role of EFH. Should any form of manipulative research in the future be undertaken in EFH that has the potential to cause temporary adverse impacts within EFH, appropriate consultations between the granting agency and NMFS Office of Habitat Conservation will be undertaken to avoid, minimize or offset any adverse impacts associated with the research or monitoring ensuring no long-term or cumulative impacts result from the research. Any consultation procedures will follow the procedures outlined at 50 CFR 600.920. Reserve research policy requires researchers to have secured all outside approvals/permits (Federal/State) prior to obtaining written approval from the research coordinator.

5.7.5 Coastal Zone Management Act (CZMA) and Consistency

The proposed Mission-Aransas NERR is within the boundary of the Texas Coastal Management Program (TCMP). The TCMP maintained the coastal management plan (CMP), which is based primarily on the Coastal Coordination Act of 1991 (33 TEX. NAT. RES. CODE ANN. §201 et. seq.) as amended by HB 3226 (1995), which calls for the development of a comprehensive coastal program based on existing statutes and regulations. Key elements of the Coastal Coordination Council and its implementation regulations (31 TAC §§ 501-506) detail the general provisions, goals and policies, boundaries, state procedures, and Federal procedures for the Coastal Management Plan. NOAA's Office of Ocean and Coastal Resource Management approves coastal management plans under the authorization provided by the Coastal Zone Management Act. On January 10, 1997, the state of Texas received Federal approval of the CMP (62 Federal Register pp. 1439-1440). The proposed Mission-Aransas NERR is consistent to the maximum extent practicable with the Texas coastal management program (Attachment A) (15 C.F.R. Part 921.13(a12)).

Section 307 of the CZMA requires that Federal activities (to include financial assistance projects) should be certified by coastal states and territories with approved coastal management programs under the Act that the activity is consistent with the enforceable policies of the program. Prior to the Reserve approval, annual grants being awarded, future acquisitions or construction projects associated with Reserve implementation, all proposals must be certified by the Texas Coastal Management Agency that such activities are consistent with the policies of the respective coastal management programs.

The TCMP has closely followed the nomination process and is represented on the Reserve Advisory Board and will be the recipient of much of the data and studies undertaken in the Reserve. Analysis of the proposed action by NOAA finds that designation of the Mission-Aransas Estuary as a NERR site will help the TCMP achieve many of its goals, including goals 1, 2, 4, 5, 8, 9, and 10. The results of future research, monitoring, and education/outreach efforts will potentially have positive impacts or influences on all of the Coastal Natural Resource Area (CNRA) found within the Reserve and have potential transferability of information useful to other CNRA's throughout the State. NOAA concludes that the proposed Federal action is consistent to the maximum extent practicable with the approved TCMP.

5.7.6 National Historic Preservation Act (NHPA)

Under the National Historic Preservation Act of 1966, the Secretary of Interior has compiled a national register of sites of significant importance (Figure 36). NOAA believes that the Reserve and associated activities will not negatively impact registered sites or eligible sites. The draft Coastal Lease (Attachment A, Appendix 5) has a specific provision requiring the UTMSI to cease any operation if a site, object, location, or artifact of archaeological, scientific, education, cultural, or historical interest is encountered during their activities and to notify the proper authorities so that appropriate action can be taken to protect or recover the findings. NOAA has contacted the TX SHPO with its opinion that Reserve designation will not adversely impact registered or eligible sites, and is awaiting a response from the SHPO.

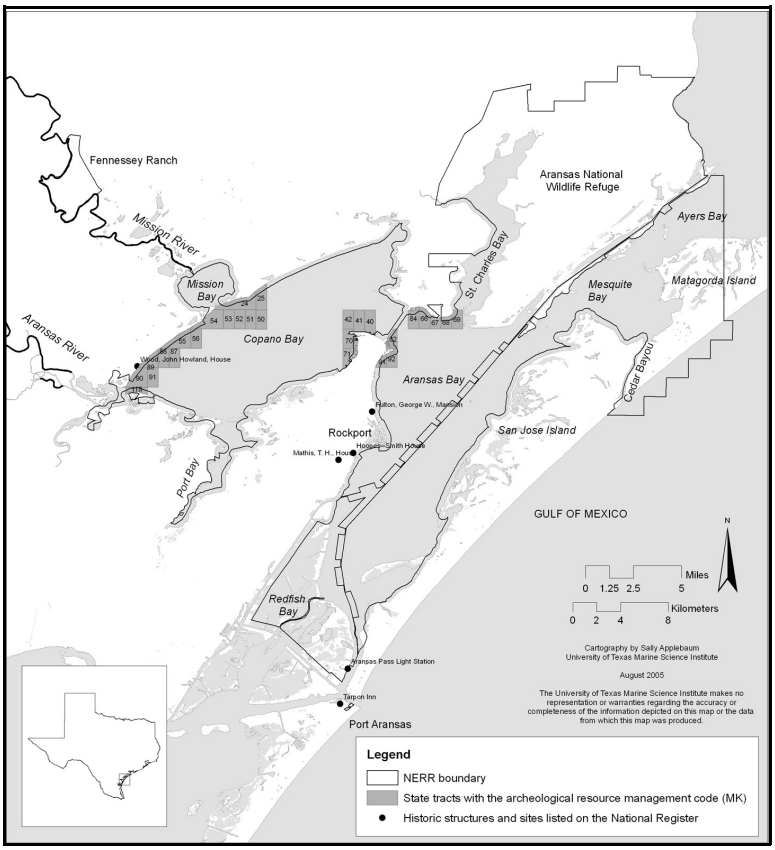

Figure 36. Locations of historic structures and sites listed on the National Register and General Land Office state tracts with the archeological resource management code.

5.7.7 Environmental Justice

Consistent with the President's Executive Order on Environmental Justice (Feb. 11, 1994) and the Department of Commerce's Environmental Justice Strategy, the designation of the Mission-Aransas NERR will not have disproportionately adverse human health or environmental effects on minority or low income populations. No action will displace minority or low-income populations but many of the actions such as the education program to bring K-12 children to the Reserve will benefit all populations with active measures being taken into consideration to ensure that all schools have the opportunity to visit specific sites and participate in educational activities.

5.7.8 Executive Order 12866

Implementation of the Reserve and MP does not constitute a "significant regulatory action" as defined by Executive Order 12866 because: (1) it will not have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities; (2) it will not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) it will not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; and (4) it will not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

6.0 COORDINATION AND CONSULTATION WITH OTHERS

This document is a product of the combined efforts and inputs of numerous individuals. Dr. Sheldon Ekland-Olson (Executive Vice President and Provost), Dr. Juan Sanchez (Vice President for Research), Dr. Mary Ann Rankin (College of Natural Sciences Dean), Ms. Mary Abell (College of Natural Science), Ms. Joni Goan (University of Texas Office of Sponsored Projects), and Ms. Gwen Grigsby (The University of Texas System) provided advice and consultation throughout the environmental impact statement and management plan process to help navigate through Federal, State, and University policies and procedures.

We would also like to acknowledge the advice and support of the Texas General Land Office including Mr. Sam Webb (Coastal Resources), Dr. Peter Boone (Energy Resources), Mr. Tony Williams (Asset Management), Mr. Tom Tagliabue (State and House Relations), Ms. Debbie Danford (Coastal Management Program, CMP), Ms. Tammy Brooks (CMP), and Mr. Daniel Gao (CMP).

Other valuable contributions were provided by individuals representing land owners of the proposed site including Ms. Sally Crofutt (Fennessey Ranch), Ms. Maggie Dalthorp (Coastal Bend Land Trust), Superintendent Charles Holbrook (Aransas National Wildlife Refuge, ANWR), Mr. Tom Stehn (ANWR), Mr. Troy Littrell (ANWR), Mr. Joe Saenz (ANWR), Mr. Chad Stinson (ANWR), Ms. Kay Jenkins (TPWD), Ms. Mary Orms (USFWS), Dr. Roy E. Crabtree (NMFS), Mr. Carter Smith (TNC), and Mr. Mark Dumesnil (TNC). We would also like to thank Aransas County Judge Glenn Guillory, Commissioner Felix Keeley (Aransas Navigation District), Mr. Tom Blazek (Rockport City Manager), and Rockport City Mayor Todd Pearson for help and advice during the management plan process.

The scoping meetings began with a brief introduction by UTMSI director Lee Fuiman. The introduction was followed a description of the environmental impact statement process by Ben Mieremet of NOAA. Laurie McGilvray of NOAA then gave an overview of the NERR system, which was followed by a description of the Mission-Aransas NERR process by Dr. Paul Montagna from UTMSI. A question and answer session was then facilitated by Ben Mieremet. Court reporters were present at all three meetings to accurately document public comment and concerns raised.

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LIST OF ATTACHMENT AND APPENDICES

Attachment A. Draft Mission-Aransas NERR Management Plan

- Appendix 1. National Estuarine Research Reserve System Federal Regulations
- Appendix 2. Detailed information about activities on lands/waters and existing resource protection
- Appendix 3. Draft Memorandum of Understanding between UTMSI and NOAA
- Appendix 4. Draft Memorandum of Understanding between UTMSI, GLO, USFWS, CBLT, Fennessey Ranch, TPWD, TxDOT, CBBEP, and Aransas County
- Appendix 5. Draft Coastal Lease for Scientific Purposes from GLO to UTMSI
- Appendix 6. Information on Key Reserve Partners in the RAB
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